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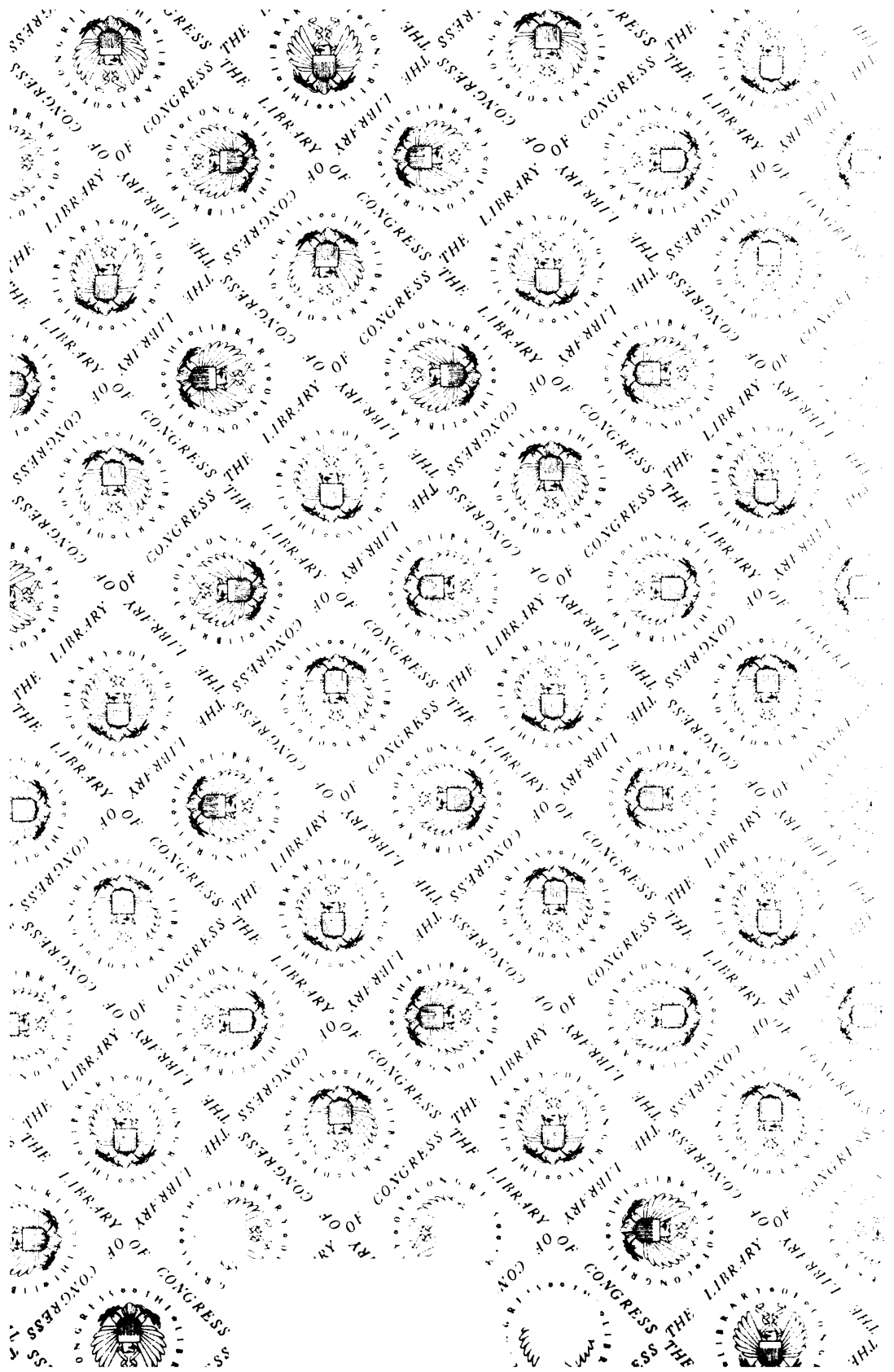
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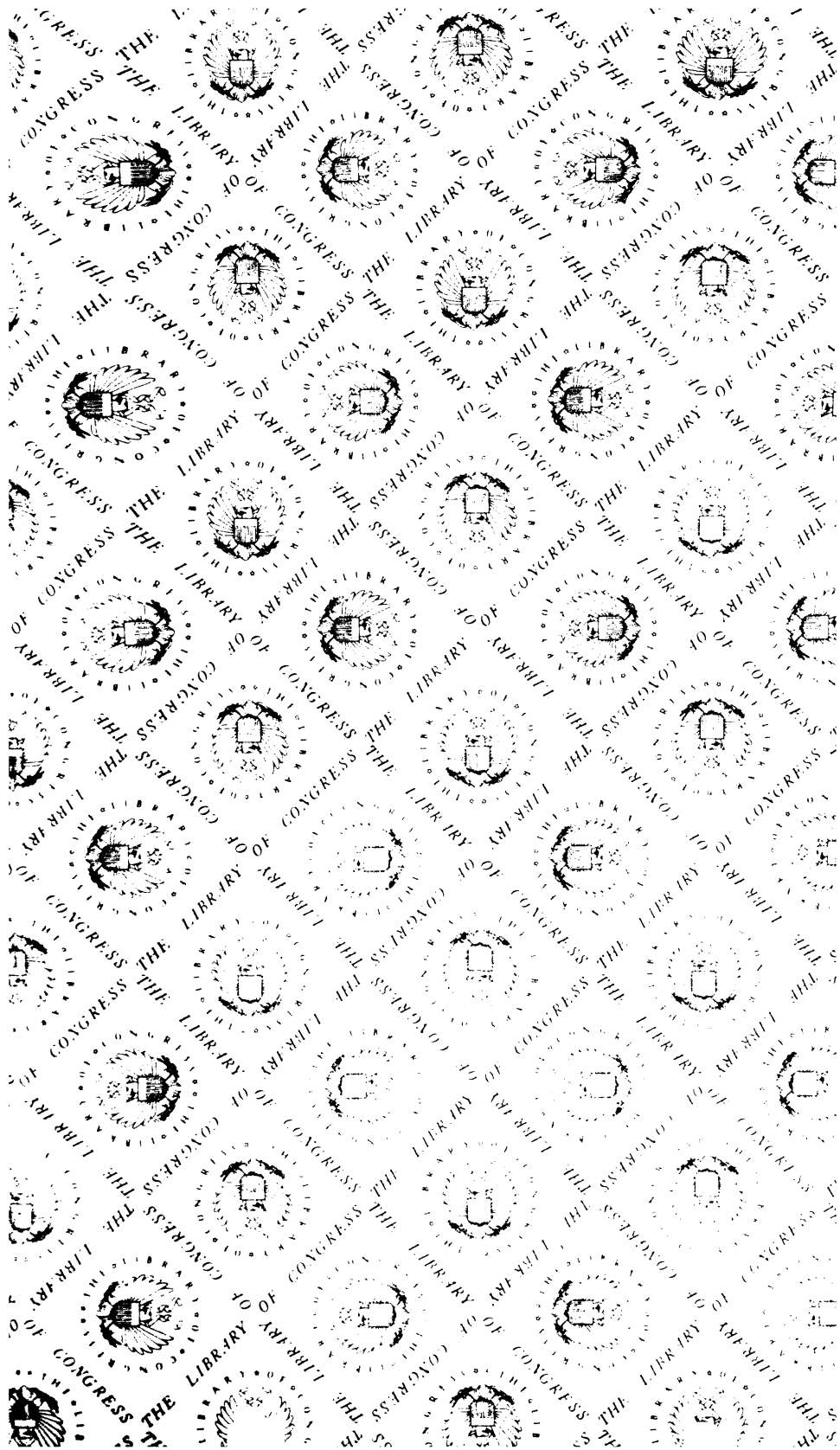
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THE
COUNTRY GENTLEMAN'S
MAGAZINE

WITH ONE HUNDRED AND SEVEN ENGRAVINGS

VOL IV



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HORA SYLVANÆ.

In the present Volume, three sheets of this work have appeared. The reader is recommended not to bind them until further sheets have been contributed, so that the entire work may appear in a separate Volume.

THE COUNTRY GENTLEMAN'S MAGAZINE

JANUARY 1870

THE IRISH LAND DIFFICULTY.



NEVER was a subject of public discussion—and which carries with it so much momentous importance—so well named as this. It is, indeed, a difficulty, or rather, we should say, the land question is one made up of many difficulties. Curious is it, and marvellously unsatisfactory to read of, or hear about, the many views which are promulgated in connexion with it. We say marvellously unsatisfactory, for so incongruous are those views, so thoroughly antagonistic to each other, so characterised, in some cases, with the wildest and most dangerous enthusiasm, and, in others, with a strange stoical apathy almost as dangerous, although in another direction, that it seems to be a matter of impossibility to get the question discussed, let alone settled, in anything like a fair and reasonable way. If settled at all, settled it will assuredly be only to the intense dissatisfaction of some; very likely not to the gratification of many, if, indeed, any. Certain to the intense dissatisfaction of some, shall we say a goodly number; for so wild and revolutionary are their claims, that it is manifestly impossible for any Government of this country to listen for a moment to them, far less to grant them. If so granted, a blow would be struck at the root of all rights of property, which all, even those who now push forward such extreme views, would, sooner or later—rather sooner than later—have bitter reason to regret. It is a pity; but, neverthe-

less, we seem to be shut up to the fact, that it must be so, that the subject, or, indeed, any subject, cannot be discussed by those immediately concerned in the immediate solution of its difficulties, with that calmness and reasonableness which it assuredly demands. They talk of the fervid energy of Scotchmen, but it is freezing coldness compared to the way in which Irishmen take up any subject they are interested in. And, unfortunately, this is all the more intensified by the idea which so many, if not the majority, of Irishmen, have, that, as a matter of course, they are ill-used, “robbed, wronged, and down-trodden by the English;” and this is so deeply ingrained that it is not possible, apparently, to get rid of it; and hence the apparent inability of all conciliating, or so-called conciliating, measures. It is not easy to please a man who is determined—do what you will—not to be pleased; nor, on the other hand, is it easy for you to continue to exercise towards him all the virtues of a Christian, when he persists in denouncing you, with all his vigour, as a savage, incapable of any virtue whatever. Hence the amazing difficulty in solving this Irish question; and it is a point which, for party or other purposes, is persistently kept out of view; but which, if admitted, as on the merest glance at the matter it must be admitted, would give us the key to many a thing which happens across the Channel, for which we seek, but of course seek in vain, in

Before taking up some points not touched upon in our last article, we may be permitted, in the first place, to do away with a misunderstanding, and, in the second, to define a position. That misunderstanding refers to what we said in our previous paper as to the dislike which existed on the other side of the Irish Channel to the people of the countries on this side of it. We would have thought that no one who read what we did say on this point, would read it as if it referred to the whole of the Irish people. But what is obvious to one is not so to another, hence the necessity of a disclaimer, that we did not mean in our censure to take in the whole people. But, while saying this, we must further say that, if it is not the majority of the people who have the intense dislike of the English, to which we alluded, assuredly those who give utterance to this dislike in no measured language, at monster meetings and in public prints, are the majority, for the minority is either so small or so feeble that what it says on the other side is heard in as feeble a way, or, to put it, perhaps, more correctly, not heard at all. Hence, as the voice of dislike, and of the discontent to which it gives rise, is so loud as to drown all other voices, and comes, to say the least, from a very large body of the people, it becomes all true Statesmen to take note of it, as an element which will and must influence the settlement of all questions which have arisen, and, if we understand the Irish people aright, will yet arise between them and the English. Every day brings with it, if not a more intensified dislike of us, at all events an expression of it, on the part of a large body of the people, louder and more fierce, so that matters in Ireland are becoming an absolute scandal to civilized society. So much for the misunderstanding, and on points connected with it. The reader will now permit us to define a position, or rather our position, in the discussion of such a question as the one now before us. It may be said, as indeed we believe it has been said, that, in our first article under the present head, we have gone out of the province of a journal such as this is, and have invaded that of "politics." If by the term here named is meant the hackneyed—

shall we say cant?—expression which involves the tactics and the aims of *party* politics, to the charge as made above, we unhesitatingly say no! We have not invaded *this* province of politics; but if by the term is meant, what we conceive the term in its higher and nobler sense means—the polity of a people—then our answer is as unhesitatingly, yes! Concerned with, and interested in, the progress of agriculture, as an art or science—call it which you will—which is closely connected with all the departments of what may be truly called the polity of a people, interested in nearly all, if not all, of the great social questions of the day, bearing upon the welfare—material at least—of the people, we maintain that no journal connected with this science can possibly do its duty without going into, and being fully interested in, the points connected with such a polity. We shall, therefore, freely discuss all the points which are from time to time raised, in that manner which concerns itself only, with the real merits of the question always—in a one-sided party way never. In a brief sentence, our position is this—taking the two definitions of politics which dictionaries give us—first, the “science of government;” second, “the contests of parties for power,”—we are interested as agriculturists in the first, and shall ever claim a right, and mean to exercise it, to discuss all points connected with it. With the second we have nothing whatever to do. No matter from what party a good measure in the interests of agriculture comes, that measure we shall heartily applaud; from whatever party, on the other hand, a bad measure comes, that measure we shall no less heartily condemn. We have party opinions, like the majority of men, but it would be utterly out of place to obtrude these upon our readers; what we have to do, and what we mean to do—as without fear, so without favour—is to watch closely all the questions connected with agriculture, and express plainly what we think of them. The definition of our position in this matter is required of us here, for other questions are rapidly coming into public view, and into the arena of public discussion,

which are called political, but with which agriculturists have closely to do: these we shall consider as bearing upon the general weal of the farming public. We are now at liberty, having cleared the ground before us, to take up the points connected more especially with the subject under discussion.

We concluded our last brief article on this all-absorbing subject by drawing attention to the practical absurdity of the views held by some—we may say by very many—who ought to have sounder and more reasonable notions regarding the relationship existing between landlords and tenants, and pointed out the difficulty there is in gaining a reasonable settlement of the question, when such views are gravely promulgated as the only means of settlement. The same absurdity crops out in more than one direction. Take, for example, the cry for “fixity of tenure.” Leaving, for the present, all inquiry as to what this really means, let us glance at the practical result if such a system were carried out in Ireland. If the present occupiers of land conceive that they have a “right” to the land, in so far that, being Irishmen, Irish land is their property, a position, be it noted, again and again reiterated as the gist of the whole question, by men, moreover, other than mere agitators, and that, so long as they do not obtain this, they are grievously wronged by the landlords who refuse it, and not getting what is their right, are therefore the subjects of oppression, if not of robbery; for the term, ugly as it is, is pretty freely handed about across the Channel, what is the position, or rather, what will be the position, of matters when this *right*, so-called, is granted to the present possessors. Would, or would there not be *other* parties who would claim *their* rights to the land possessed by those who are *now* clamouring for fixity, or rather perpetuity of tenure. Is it not conceivable—truly, it is easily so—that some Irishman who had no land might go to the possessor of it—who obtained perpetual possession under this new idea of land management? “Why, Pat, you are as bad as one of the ould landlords; you have got a snug houlding of 20 acres, I have got none. Who gave you the right to keep an honest man, like

meeself, out of the land, which is as much my right as yours? We are both Irishmen, and you got your whack by claiming it as such, bedad! But I am a better Irishman than yourself—get *out*, thin, wid ye's, and let me *in*!" The claim of one Irishman is just as good as another, and so long as the claim is made upon *this* ground, then it is difficult to see what right we have, by Act of Parliament, to put one class in possession of land, to the exclusion of others, who have as good a claim on this principle, if it be a principle, where it appears to us there is an utter rejection of all principle. It is no answer to say, that this is an absurd way of putting an absurdity. Absurd the whole thing undoubtedly is, but there is a vast deal of real mischief in connexion with it. When we read, as we have read to-day, the opinions of legal men and men of business—than whom none stand higher—that such views as are now prevalent in Ireland, this, amongst them, are already exercising a most prejudicial influence upon the value of property, it is high time to give over pooh-poohing, such views as simply absurd, and to look upon them in a more serious light. A madman's views are no doubt absurd, but we do not look upon them as light things to be disregarded; no! we lock him up in a mad-house, and if he is so very absurd as to think the killing of a keeper or two a light matter, we encase him in a strait waistcoat. If fixity of tenure is to be granted, then upon this principle of settlement we do not get rid of the grievance, we only shift it to other shoulders; we simply perpetuate it, and perpetuate it in the worst of all ways, by placing it upon an incline, each successive descent on which lands it to a lower depth, or, perhaps, we should say, raises it to a higher height of mischievous agitation.

But there is a more reasonable view held than that we have already named, and which is that fixity of tenure is claimed, not upon any such very absurd idea as that because an Irishman is an Irishman he has a "right" to Irish land—a view which cannot be too often refuted, held as it is by many, and advocated with all the fervour which distinguishes our brethren across the Chan-

nel—and this is, that fixity of tenure is the "right" of those who are already in possession, because—the logic of logic is, it is, is not ours—they *are* in possession. Leaving for after consideration what *this* claim involves, we at present content ourselves by asking where is this sort of thing to stop? Is it true, or not true, that we are a united people?—that our Government is an *Imperial* Government? If these are answered in the affirmative, then what is good for Ireland is good for England and Scotland; nay, more, if it is good for one kind of property, it is good for other kinds of properties. If you begin with farms, why do you stop there?—why not take in shops, houses, factories, and the like? Much, if not a vast deal of all the mischievous agitation on this land question has arisen from what we conceive to be as mischievous a principle, namely—that the Irish people should have exceptional legislation applied to them because they are "dissatisfied." This cannot be dignified with the name of a principle. Mighty easy will it be to get up claims on this ground; and if it is to be a motive principle with our legislators, let them look to this as a certainty, that they will henceforth have no easy time of it, that the land question is not the last, nor by many questions likely to be the last, which will arise to claim their care. There is a potentiality of demand in this claim of mere dissatisfaction, which those who gave it a place as a power to legislation do not at present dream of. The principle does not stop, moreover, at Ireland or in Ireland; it may work in England and Scotland. As, for example, we can suppose that the state of trade, which is bad enough in the manufacturing districts, gets worse; and, in place of the patient fortitude with which the working classes have borne their misfortunes up till now, stern dissatisfaction arises and all the evil which it brings in its train. We have seen them before, and we can suppose that, viewing their empty cupboards and their cold and cheerless hearths, they may rise as one man and say, "this state of things shall no longer be; we think it a wrong thing that our masters should live in mansions, and we

in cottages ; that they should drive to their mills in carriages, and we go to them cold and a-foot. We are Englishmen, and we have a right to English property. We know that you gave the Irish what they wanted, because—or, at least, you named it as one of the main reasons—they were dissatisfied. Give us what *we* want, we are no less dissatisfied than *they*.” Are we wrong in putting the matter in this way? Assuredly not. It is a fair argument against what we conceive to be a highly dangerous principle, bringing about what is always a dangerous thing, “exceptional legislation.” We put the matter in a coarse but graphic way, when we say, that “what is sauce for the goose is sauce for the gander.” What is held to be a good argument against the owners of one kind of property, must be held as good against all other kinds of property, *as* property. The agitation may be, as it is at present, confined to proposals to deal with the property of the large proprietors ; but let all be well assured that it will not stop there. Such principles, if once admitted, will be made to apply to all properties, and the proprietor of limited property, who, for party or other purposes, can afford now to consider complacently the probability of gigantic properties being divided, or used in defiance of all right, may awaken some day to the sad conviction, that in allowing such dangerous doctrines even to be broached, let alone daily reiterated, without an emphatic denial, he has been playing with “edge tools” which will cut his fingers also. Let it be remembered that there are always some people who have got less property than others ; and if the principle be admitted which we have been dwelling upon, the small holders of property may, nay, *will* find that that same one who has got less, and therefore wishes more, can, upon this principle, demand his. What are all these claims but the wild dreams of Communism trying to be put in a concrete form? Let all who have property, or respect its rights, look to it.

This question of fixity of tenure must, therefore, be shortly put out of court, going

against, as it does go against, all those high and sound principles which form the cement, so to say, which causes the body politic to cohere together, and form the solid mass which best resists the efforts of anarchy and the wild dreams of Communism. In the interests, therefore, of the whole community, specially of the landed and farming community of this country, we believe with the *Times*, that

The time has arrived when it is necessary that the principles of action to be recommended to the Legislature, with reference to the Irish land question, should be plainly stated. There are, unhappily, men in Ireland whose immediate object appears to be the encouragement of the wildest demands, for no other purpose than to bring about the reaction of resentment, which must follow when the impossibility of conceding them, they themselves know to be certain, is proclaimed. . . . And neither the Minister of the Crown can propose, nor Parliament entertain, any scheme for dealing with the Irish land question which does not proceed on the old lines of procuring public good by respecting private rights, and passionate attempts to drive the Legislature to depart from this course are only too likely to beget the deplorable consequence of a postponement of legislation.

There are other questions connected with the subject ; as, for example, that connected with “small holdings” as against large farms. These we purpose taking up in another article.

It is worthy of note that the soundest authorities on agriculture, and those better acquainted with farming in its most scientific as well as its practical aspects, pronounce unmistakeably against all such methods of settling the Irish land difficulty by carrying out any system—such as “fixity of tenure”—to which in our last article we drew special attention. There are, doubtless, some who, from their position, and assumed or presumed knowledge of farming, are in favour of this system ; but if they are important authorities, they certainly are not numerous. Those—and, as we have said above, they comprise nearly all sound authorities—who go against “fixity of tenure,” go against it not simply because the principle it involves is an utterly wrong one, which no sound politician—using this term in that nobler sense to which in our last article we alluded—would, or rather could, agree to, but because it brings about

that wretched kind of farming, and that still more wretched—because more obvious—style of living which those who follow it live, which are both so productive of evil to the community, that they ought, if possible, to be avoided, assuredly not sought after. We have said that this “fixity of tenure” system brings about those evils—we should rather have said, is likely to bring them about—for no such monstrous system has yet been carried out to give us any data as to what the real results of its working would actually be. And we, at all events, most fervently trust that we shall be allowed to remain in ignorance of what it would actually bring about if in force—in force, if the nation is wise, it will never be allowed to be put. We have said that the soundest authorities on farming are against this system of “fixity of tenure,” not only on account of the evils above alluded to, and to which we shall presently further refer, but because it is altogether a wrong thing. Take, for example, that authority who represents, and represents well and ably, the tenant farmers of England, and what says he on the point? After stating—and the statement is a most pregnant one, fully corroborating all we said, and justifying the severest strictures we gave utterance to in our last article—that the tenant farmers of Ireland were unanimous in demanding “fixity of tenure,” he asks, “What does this mean, but that every man who is now occupying an acre of land in Ireland shall occupy it as long as ever he likes, at the present rent?—that as long as he pays the landlord his present rent, the power of eviction shall be removed from the landlord; the landlord shall become a sort of lord of the manor, but he will hardly do this, because the lord of a manor inflicts a fine whenever he has a new tenant. He will not be so well off as this, but be something like a receiver of tithe-rent charge; the only alteration is to be in the case of a depression or advance of prices.” “I would ask,” he continues, “if it is good for the country—independent of its being a flagrant assault on the rights of property—is it *good for agriculture*, and is it good for the nation at large, that anything so preposterous should

be granted?” Another authority has the following:—“If fixity of tenure really means (as it is understood in England to mean), the handing over of the property of the landlord to the tenant, subject to a mere rent charge to the owner of the soil, then I say such a scheme deserves the reprobation and strenuous opposition of every honest man in the kingdom.” Another authority says, “If the rights of property are to be ignored in this way, the civilization of Ireland will be thrown back a century!” So much for the “wrong” which this “utterly absurd and totally impracticable system involves, and which wrong it is necessary again and again to allude to and denounce, seeing it is held as the first of the authorities above quoted says, by the *whole of the tenant-farmers of Ireland*, and by a number of politicians who have, or are presumed to have, influence over the nation. But we have said that men who know what farming is, go against the system for the evils it is likely to bring about in encouraging bad farming—or waiving this point for the present—or at least a style of farming which is not so conducive to the interests of the community as farming on the large scale, carried out with all the appliances which modern science and skill give to the farmer. This point at once brings us to the question of “small holdings,” which has been and is now maintained by men high in political position, as the perfect panacea for the ills which Ireland is heir to. This is a large and important subject to be taken at the end of an article—brief as we are compelled at present to make it—suffice it to say that we are no believers in the system of small holdings worked out in this country; that, as applied to Ireland, it is specially ill-fitted, that it would bring about and perpetuate the worst evils of the worst times in Irish farming and farm management: that, in brief, it is not adapted for our natural exigencies, all of which we hope to be able to prove in a forthcoming article. Granting meanwhile, that we are correct in this, let the following be taken as remarkably pregnant of the “fixity of tenure system” to be carried out in Ireland. We quote the words of C

of the present Ministers of the Crown :—
 "There are still in Ireland 175,000 holders of land who occupy, on an average, $4\frac{1}{2}$ acres, paying £4 a-year rent. . . . How is it possible that the occupier of a miserable holding, such as we have described, could effect *bona fide* improvements on his land, when poorer than any English labourer!"

With such a state of matters, we ask, will its perpetuation under "fixity of tenure" tend to the benefit of the nation at large, and to the progress of the art of agriculture, upon which it is so largely dependent? We shall see what will be the results of a more detailed reply, should any of our readers have a doubt as to what the reply should be.

TOWN DRAINS AND COUNTRY SEWAGE.

IN a recent article under the head of "What is to be done with our Town Sewage," a few of the points connected with this, always discussed, apparently never to be settled, yet undoubtedly important question, were taken up and briefly adverted upon. One point dwelt upon was the distinction that is certainly often lost sight of between a drain and a sewer—meaning by the first of these terms, the drain used for agricultural purposes. The distinction between these having been pointed out in the above article, we need not further allude to it; but the article has brought to our minds some points connected with our town drainage system, and their bearing upon the use of the sewage which is derived from it, as applied manurially to our farm crops; and which points, if not often discussed, and in some quarters persistently ignored, have a very remarkable influence upon the general question which gives the title to the paper above alluded to, "What is to be done with our Town Sewage?" Our readers are well aware that the feature of our modern town drainage system is the employment of water as the vehicle by which the waste matters of our houses, factories, &c., are carried off—no matter where at present—from their immediate vicinity; the use of this water necessitating that of drains. The origin of this water-drain system may be supposed to have been as follows :—

In early times when the population was scant, and their dwellings were thinly scattered here and there, the neighbourhood of a river was, for many obvious reasons, chosen as their sites. Closely situated to the

river's banks, the refuse of their houses was naturally thrown into its stream, which found at once the most obvious and effectual carrier. But as the population increased, and their dwellings crushed in one upon another, many were forced to be built at a considerable distance from the stream. Labour is always grudging where labour is disagreeable, or can by any easy method be avoided; the daily journey to the river to throw in the refuse was, therefore, in time given over, and the end was served, or endeavoured to be served, by the digging of a hole, or the raising of a dung-heap, into which the refuse was thrown, or upon which it was heaped. But the holes, called "cess," hence our modern cesspools, in time overflowed; and to lead the matter thus collected to the river, ruts or open drains were made in the ground. These spreading around odours, not by any means suggestive of the

"Sabeian odours from the spicy shore
 Of Araby the blest."

were then covered up in order to abate the nuisance to sight, if not to smell; and as the matters stagnating therein were in process of time found to block up the channels, water was doubtless often poured down them to clear them out. Population still increasing, the number of cesspools increased also, and in like degree the size of the channels, or sewers. In all cases, the final place of deposit was the river or the sea. Huge, ultimately, in dimensions, and faulty in construction, these sewers, or drains, leading to the river or the sea, became in course of time vast receptacles of noxious and dangerous gases, which found easy access to the upper air through the gully-holes, which were placed here and there to allow of the surface water, &c., of the streets to be passed into their interior. "Then came the disease," and so the search for the remedy. It very soon became evident that the decomposing matter thus poisoning the air was more assuredly the "wrong thing in the wrong place." The first impulse was, to get rid of it. Where? No matter, get rid of it. How? Then the recollection of the old river-carrier flashed across men's

minds, and "Water ! water !" was the cry. It is easy to understand how so mobile a vehicle as water would be at once taken as the best for conveying quickly away the sewage of our towns, and so it was ; a most elaborate system of pipe drainage was instituted, and carried out, wherever it could be adopted, by which the refuse of a house was conveyed to the sewers, and that of the sewers to the river, the removal being effected mainly by the aid of water."

This may reasonably be supposed as the origin of the water system of modern drainage, and it points out how naturally water was chosen as the vehicle for carrying from our houses, quickest and most economically, the excretæ and waste matters of the inhabitants. But, in process of time, it began to be discovered that the getting rid of these matters was not the only point to be desiderated ; for with advanced knowledge the fact came to be established, that the matters then got rid of were highly valuable in an agricultural point of view. That, in brief, the waste products of our towns, rightly applied, add to the produce of the country. Much valuable evidence has been given of late years in connexion with the value of town sewage, and the best mode of realising this to the fullest extent in its application to the land. In the short space at our disposal we can but glance briefly at the various points of importance.

Seeing the deleterious influence exercised upon our health by the action of the poisonous exhalations of sewage matter, we may note how important it is that these exhalations should be prevented from having access to or being near the neighbourhood of our dwellings. House drainage, in this department, therefore, resolves itself into two important points—first, the establishment of a final terminus for the reception of the sewage matter ; and secondly, the arrangement and construction of drains or channels to carry away the products of house sewage, as fast as possible, to the terminus, and, in doing so, to prevent its access to the external atmosphere. Now, it is quite obvious that if we do not provide a proper terminus for the sewage matter, but allow it to pass into some ill-conceived receptacle or passage near the house, and suffer the gases therefrom to pass into the atmosphere, the conditions of perfect

drainage are not carried out ; inasmuch as we suffer the noxious exhalations to surround us in a state more or less diffused, and this no matter how carefully the drains may be constructed which convey the sewage matter from the house to the terminus. In like manner, the conditions of good drainage are still unfulfilled where the drains from the house are so badly constructed as to allow the gases to permeate the surrounding soil, and from thence pass to the atmosphere, however efficiently the terminus of the sewage may be constructed and arranged. It is, therefore, essential that the place of final terminus, and the drains leading thereto, should be equally well constructed, and so arranged as to retain the matters conveyed through and to them.

The terminus of the drainage matter is obviously different in rural and in town districts : in town districts it is the main or large sewer which is constructed in the roadway or street ; in rural districts it must be specially constructed, the best form being the closed liquid manure tank—the worst the open cesspool. It is surely unnecessary to say that these abominations, the open cesspools, should never be allowed to take a place in any system of house drainage. If the inhabitants of our farm houses and villas could be made aware of the gaseous matter hovering over and continually arising from the open ditches, gutters, or cess-pools, environing, or near their habitations, they would be as anxious to get rid of these " fever spots " as they are to fly from the contamination of the plague. In discarding the open cesspool, and substituting therefor the closed and air-tight liquid manure tank, not only is the great advantage gained of getting rid of a positive evil, but another, and perhaps to some a more important end is gained by the adoption of the plan, inasmuch as a direct pecuniary gain results from the saving and storing up of a highly valuable manure. It is just probable that this result will be more highly appreciated than the other. Unseen good, like unseen evil, is not much taken note of ; attach a pecuniary loss to the one or a pecuniary gain to the other, and how differently is their importance viewed !

For horticultural and agricultural purposes, the sewage matter obtained from the refuse of domestic operations and the excretæ of the water closets, is highly valuable as a manure. Diluted to a moderate extent with water, it is even more valuable than in a highly thickened condition. This fact, in connexion with the use of house sewage as a manure, is of great importance, inasmuch, as the level of the tank must not be overlooked with reference to the level of the house which is to supply it. The drain should deliver the sewage at a distance, say of 12 or 16 inches from the top line; then, as the drains should have a considerable fall from the house to the tank, at least one in twenty, it necessarily follows that the level of the tank will be considerably below that of the house. We purpose devoting a special paper, shortly, on the construction of liquid manure tanks.

Having thus explained the nature of the terminus for sewage matter of country or suburban houses, we next come to the consideration of the best method of insuring a quick delivery from the house to the tank or terminus. Efficient house drainage involves several points for consideration. First—from the solid matter necessarily connected with sewage, it is essential that some agent should be used to prevent this solid matter from being deposited in the interior of the drains, and which tends to block them up. Second—it being essential that the sewage should be delivered as quickly as possible to the place of its final deposit, the size, the shape and the manner of laying the drains must be so arranged as to facilitate this quick removal. And, third, from the circumstance that much of the sewage matter is passed from the interior of the house, as the sink in the kitchen, &c., apertures are there necessitated, leading directly to the interior of the drains, and it is necessary, therefore, to adopt means by which the gases prevailing in the interior of the drains should not be allowed to pass into the interior of the houses through these apertures. Under these three heads we shall be able to point out many important points connected with house drains.

In carrying out the condition mentioned under the first head, "water" is the grand agent, without which all drains, however well laid down, will soon become inoperative. All the water, therefore, resulting from domestic operations, as in the scullery, wash-house, water-closet, overflow of water-tanks, &c., should at once be passed to the interior of the drains. "No drains," says an authority, "can be efficient through which there do not flow currents of water. Without a provision for this regular and abundant supply of water, drains not only fail in accomplishing their object, but they become positively injurious. They generate and diffuse the very poison the formation of which it is their object to prevent." To carry out this desideratum thoroughly, it is necessary that the drains should be so placed as to receive the sewage a little below the level of the surrounding ground. Hence is deduced the rule, that in no case should operations be carried on requiring the use of large quantities of water, or small quantities frequently repeated, within apartments situated below the level of the ground. This does away, therefore, with wash-houses, sculleries, &c., in the cellars or basement apartments; therefore the sink or slop stone in the scullery, the tubs or washing apparatus in the wash-house, and the water-closet, should all be above ground. The water produced therefrom will thus be passed easily away to the drains, and that without the labour of carrying up the refuse water from the basement apartments. The interior of the drains may be cleaned from time to time by passing quantities of water down them. This operation, known as "flushing," is very efficient. As this is more certain in its results when the water is allowed to pass into the drains very suddenly and from a height, in some instances "flushing cisterns" are sometimes adopted, and with marked success; by opening a valve or cock, in which, by the pulling of a lever or cord, a quantity of water is passed from a cistern situated at a considerable height above the level of the drain—as in the top of the outbuilding—to the drain; this generally carries off all deposit in the drain to the final terminus.

Farm Implements and Machines.

PATENT STONE BREAKERS.

THE implements or machines which have attracted the largest share of attention during the past season are, the **STONE BREAKER**, of which three are in the field, the **STEAM FILLER**, and the **DOUBLE-FURROW PLOUGH**. The two first can hardly be termed agricultural

the maximum amount of profit; and, as the use of these machines, good roads can well and economically constructed, we justified in considering them at least as to good farming.

The Stone Breakers before the public ar

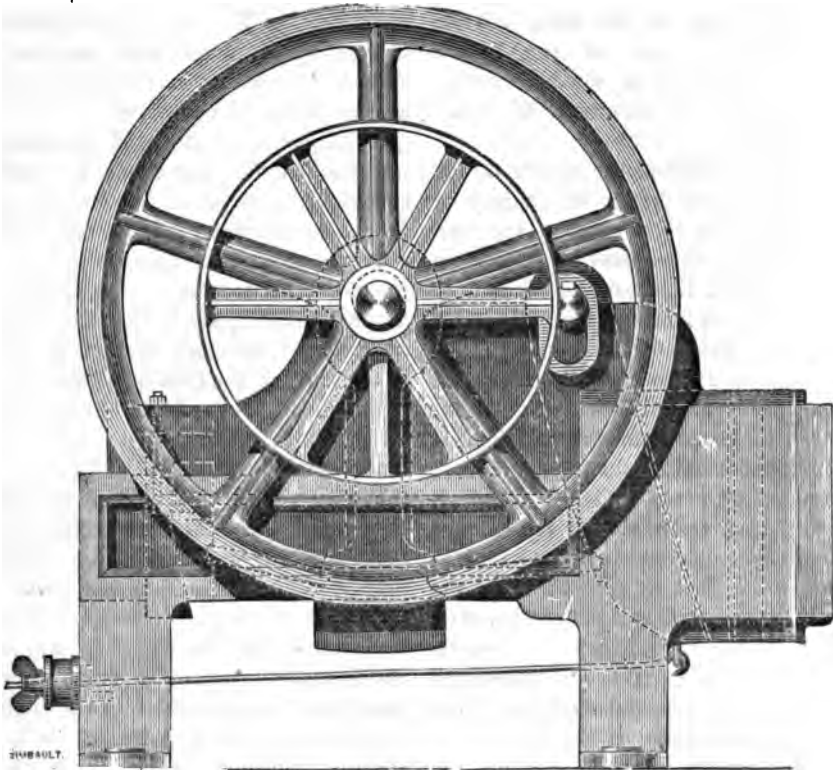


Fig. 1. - Blake's Stone Breaker—Right side.

machine in the strictest sense of the term, but their influence on agriculture being so great, we have no hesitation in classing them as Agricultural Implements. Without good roads, farm produce cannot be brought to market in a condition to ensure

1. Blake's (H. R. Marsden), of Leeds.
2. Drake Brothers & Reid's, of London
3. Archer's, of Gateshead-on-Tyne.

1. BLAKE'S STONE BREAKER,

as shewn in the three cuts, pages 11, 12, and

and 3), has been patented in Great Britain and several foreign countries. It is designed to break stones into small fragments, to be used for road making, and ballasting, concrete, also for crushing stones, furnace cinders, or other wastes, and to crush ores or minerals of any kind: likewise adapted to break flints—calcined. It is simple and compact—

The readiness with which the hardest stones yield at once to the influence of this gentle and quiet movement, and melt down into fragments, surprises and astonishes every one who witnesses the operation of the machine.

It will be seen that the distance between the jaws at the bottom limits the size of the fragments. The distance—and consequently the size of the fragments—may be regulated

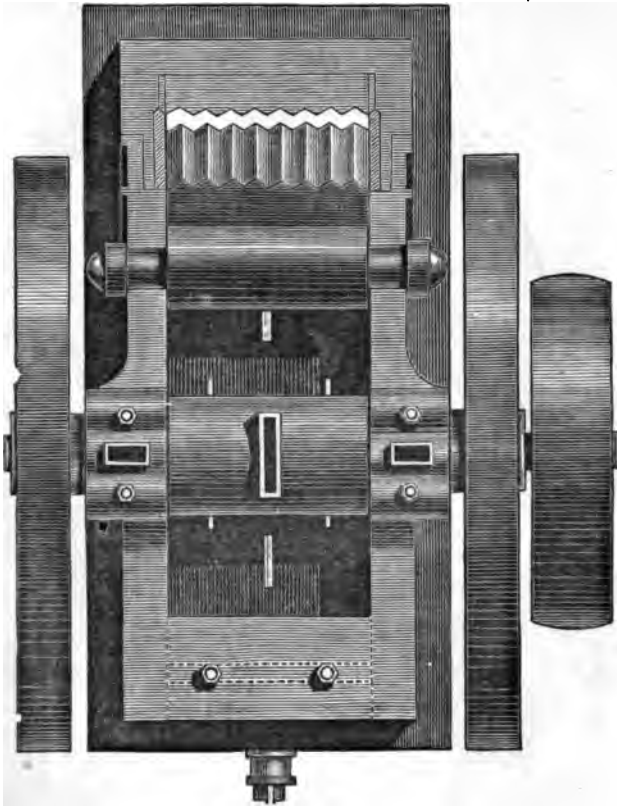


Fig. 2.—Plan of Blake's Stone Breaker.

being complete in itself, requires no external support or fixing.

Every revolution of the eccentric causes the lower end of the moveable jaw to advance towards the fixed jaw about a quarter of an inch and return. Hence if a stone be dropped between the convergent faces of the jaws, it will be broken by the next succeeding bite; the fragment will then fall lower down and be broken again, and so on, until they are small enough to pass out at the bottom.

at pleasure. A variation to the extent of five-eighths of an inch may be made by turning the screw-nut (shewn in fig. 3), which raises and lowers the wedge and moves the toggle-block forward or back.

Fig. 2 is a plan of the machine. The frame which receives and supports all the other parts is cast in one piece, with feet to stand upon the floor, or upon timbers. These feet are provided with holes for bolts, by which it may be fastened down if desired, but

this is unnecessary, as its own weight gives it all the stability it requires.

Fig. 3 shews a side view or elevation of the other parts of the machine in place as they are presented to view through the side of the frame. The circle is a section of the fly-wheel shaft, and the dotted circle is a section of the eccentric. There is a connecting rod which connects the eccentric with the toggles which have their bearings, forming an elbow or toggle-joint. The fixed

we take from the *Building News*. The principal advantage possessed by the machine, with respect to concrete, is, that the ballast is reduced to a convenient size without any great proportion of small material or dust—a great defect in many other crushing machines, as far as regards their application to breaking materials for forming concrete.

In this machine, the material to be broken is placed in a hopper at the top, and it is thus fed to the pair of crushing rolls, each of

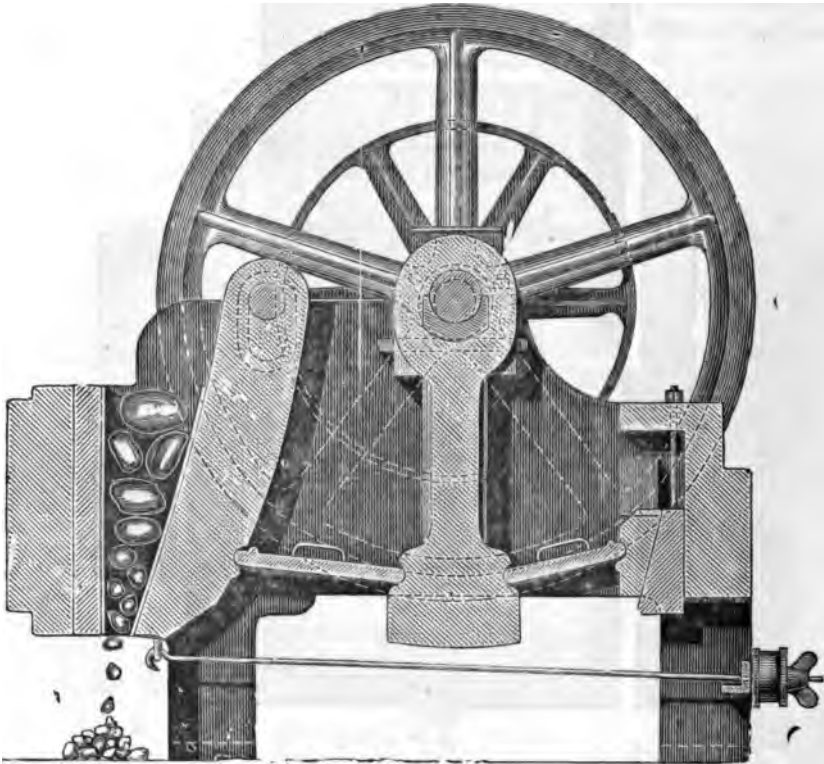


Fig. 3.—General View of Blake's Stone Breaker (Left side), with the Spring and Screw-nut at bottom of the Jaw.

jaw against which the stones are crushed, is bedded in zinc, against the end of the frame, and held back to its place by cheeks that fit in recesses in the interior of the frame on each side.

2. DRAKE'S STONE-BREAKING MACHINE.

Messrs Drake, Brothers, & Reid, of Old Kent Road, have lately brought out a new stone-breaking machine, the description of which

which is formed of a number of chilled cast-iron discs strung on a square shaft. These discs are toothed at their peripheries, the form of the teeth being varied according to the nature of the material on which they are intended to act. Two of these forms of teeth are shewn in the elevation (fig. 4) and plan (fig. 5) of the machine, and the latter view also shews the manner in which the teeth of one roller fall into the intervals between the

of the other. The two rollers are geared together by spur wheels at one end of the frame carrying them, and the bearings of one rollers can be adjusted within moderate limits by means of screws provided for the purpose.

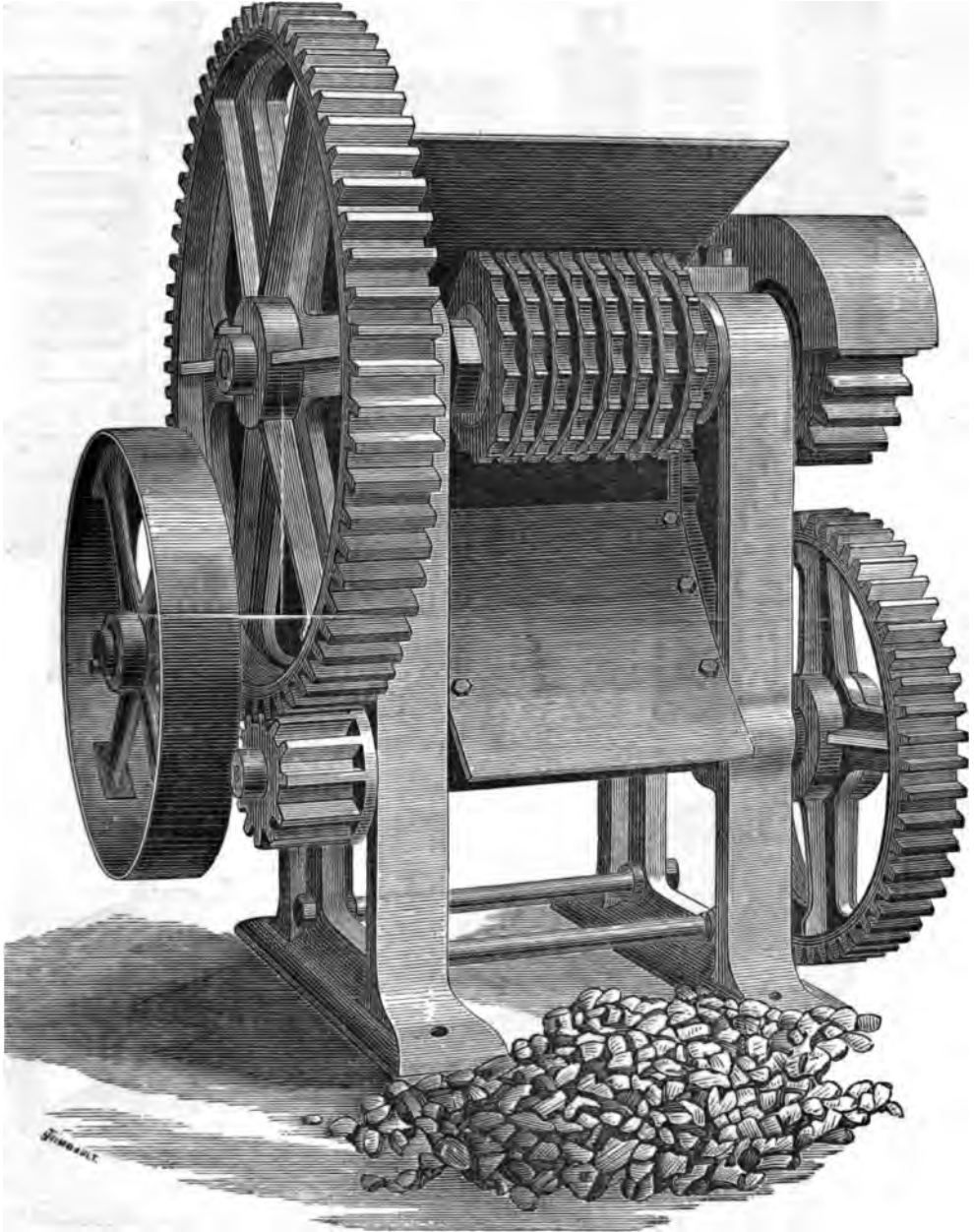


Fig. 4.—Elevation of Drake's Stone-Breaking Machine.

These shafts slide in suitable openings in the frame, so that the distance between the rolls are driven will be understood from an

inspection of the perspective view without any further explanation. broken bricks, and although specially designed, as we have stated, for preparing materials for

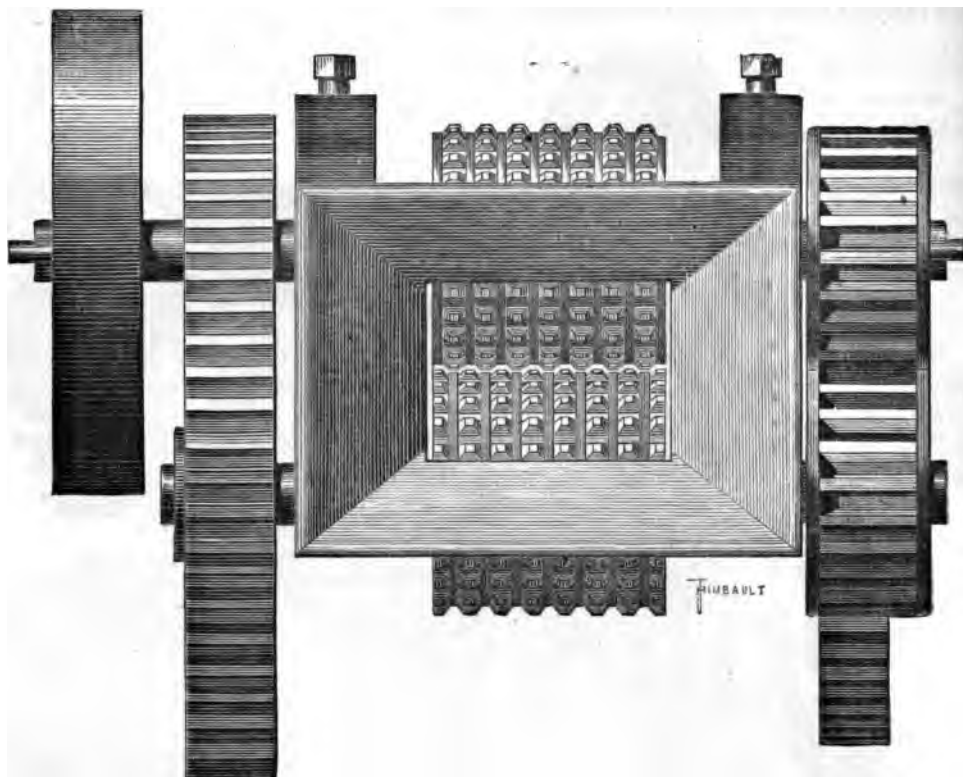


Fig. 5.—Plan of Drake's Stone-Breaking Machine.

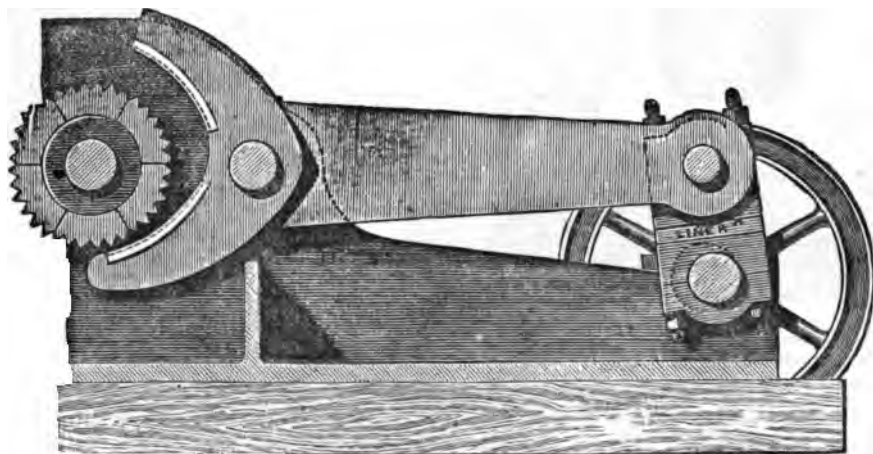


Fig. 6.—Archer's Stone Breaker.

The machine is capable of crushing almost any kind of material, from hard granite to making concrete, it may also be used for breaking road metal and other purposes

le machine is strongly and simply ed, and the fact of the crushing ing, as it were, built up of a number renders the replacing of an injured simple and an inexpensive matter. machine has been practically tried by and others, testimonials from whom seen, all of which state that the does an amount of work equal to, if assing, that effected by any other, first cost is extremely moderate in ion therewith.

ARCHER'S STONE BREAKER.

achine was invented and patented by Archer, jun., Dunston, and is simple in ruction. It has already been intro- r large contracting firms in England land. A slow revolving motion is im-

parted to the grinding or pulverising roller, and at the same time a short and powerful reciprocating motion is imparted to the lever with the squeezer on its end, thereby operating with a crushing action on the material between the roller and the squeezer as they fall and are carried round by the turning of the roller. The relative distances of the opening faces from the roller are adjusted as required by varying the thickness of the liner in the connecting link. The periphery of the roller is fluted hotizontally, and the faces of the operating lever are fluted vertically. The sizes of these flutes vary according to the size required to be broken. The smallest size is said to be capable of working off about 35 tons of road metal per day.

In our next, we shall have something to say about the Double Furrow Ploughs, &c.

AVELING & PORTER'S STEAM ROAD ROLLER.

manufacturers of this machine have or some years given much attention to tions of making and mending Maca- roads, and, so far back as 1865, they ented with one of their large road ve engines, fitted for the purpose, y wide and heavy driving wheels, and a detached cast iron roller of width t to cover the space between the out- els. The success of the experiments as to encourage them in their pur- constructing a machine expressly for and, at the same time, to satisfy at a combination of the two rollers, the trials, was the principle upon e new machine ought to be designed. utumn of 1867, an opportunity pre- self for testing the soundness of their ons, a machine, embodying the im- nts, being built for the Highway of Liverpool. Slightly different in and details, it is, in principle, iden- th the one illustrated in the next It is composed of four 2½ feet

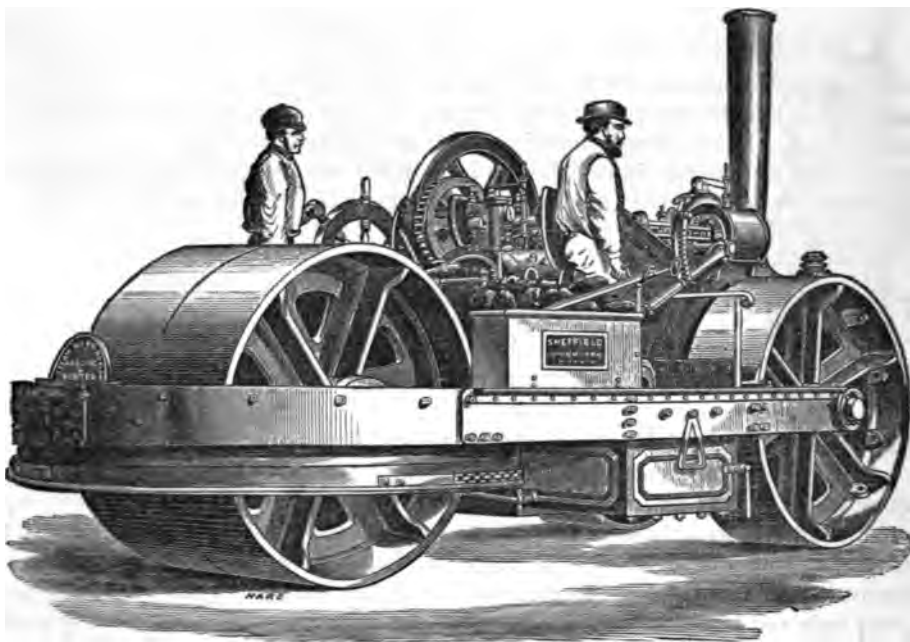
rollers, the two outside being 7 feet dia- meter, and the two centre ones 5 feet diameter. The whole rolling width is 9½ feet, and the working weight 30 tons, 19 tons of which are borne by the driving, and 11 tons by the leading wheels. Although the roller acted admirably, and is still working satisfactorily, yet it was seen that a more equal distribution of the weight, and a more convenient arrangement of some details of construction, would give a neater appearance to the machine itself, and a better demonstra- tion of its utility. It is believed that these ends are attained in the roller as now made, and as shewn in the illustration.

A long technical description of the roller is rendered unnecessary by the illustration itself; suffice it to say, that it is essentially a traction engine of Aveling & Porter's well-known pattern, modified to suit the purpose to which it is applied. All the wheels are, in a sense, rollers of such width, and so disposed, that their paths lap over each other, and thus the whole breadth of track occupied by the

engine is acted on at the one operation. And the weight being equally distributed over the whole, the compression of the rollers is equally uniform. And the rollers are of cast iron, and of different diameters and widths to suit the different sizes of machine; the outer ones work free upon the axle, and are only keyed to it by wrought iron pins, to withdraw which is to disconnect the wheels. A cast iron turn-table, strongly secured to the engine, carries a wrought iron axle, on which

of the roller, that it is calculated to work as well backwards as forwards, and to ascend any incline likely to be met with in practice. The materials employed in the construction of these rollers, and the class of workmanship, appear to be of the very best description.

The working expenses of steam road rollers may be calculated at from 15s. per diem for the 15 ton size, to 20s. per diem for the 30 ton size; this cost is for wages to driver and steersman, for coke and oil. The num-



Aveling & Porter's Steam Road Roller.

rotate the two centre rollers. The position of the steering wheel, and its mode of action, are clearly shewn in the engraving. An iron tank on each side of the boiler, and a coal bunker alongside the driver's foot plate, carry supply of water and fuel for several hours. It may also be noted as an important feature in the design of these rollers, that they are adapted for driving stone breakers, and other machinery, when not used for rolling. It will be apparent from this account

ber of square yards thoroughly rolled for the above sum, will average from 2400 with the small machine, to 3600 with the larger, or say from 12 to 16 yards for 1 penny.

A gold medal was awarded to Messrs Aveling & Porter for their roller, by the jury of the French Exhibition, held at Beauvais, in June last, and a silver medal (the only prize given to road rollers) by the judges of the Royal Agricultural Society's Show, at Manchester, in July 1869.

Our Pasture Grasses

THE BUNCH GRASS OF BRITISH COLUMBIA—*ELYMUS* *CONDENSATUS* (Fresl.)

IN our number for July 1868, we pointed out the difference between this and several other grasses of Western North America, to which the name of Bunch Grass has been applied; accompanied with quotations, descriptive of its appearance and feeding qualities, from the writings of several who were thoroughly acquainted with its native growth and usefulness; prominent among whom was Colonel Moodie, R.E., who introduced the Tussac Grass from the Falkland Islands, and by whose assistance our much-valued correspondent, Mr Robert Brown, who was then Collector for the British Columbian Botanical Association of Edinburgh, was enabled, in 1863, to send home a supply of its seeds, and thus first introduce it to Britain. To most of the members of this Association, grass seeds, however, presented little or no attraction; and, with the exception of what fell to the shares of the Edinburgh Royal Botanic Gardens, and I. Anderson-Henry, Esq., of Woodend, together with a few plants in our own collection, the Bunch Grass of British Columbia was so utterly neglected that it might have been lost to the country, notwithstanding that its merits, both as an early forage and an abundantly productive hay grass, are likely yet to secure for it a highly prominent place among the cultivated agricultural plants of Britain. With us, the *Elymus condensatus* has gone on increasing annually in stature; and although grown in the past dry summer on rather poor unmanured soil, a plant, which is represented by the accompanying en-

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graving from a photograph, was 8 feet 3 inches in height. Of this, several seed-bearing as well as leafy stems were exhibited in the collection of Mr R. T. Macintosh, at the last July Show of the Highland and Agricultural Society of Scotland; and others were shewn by its introducer, Mr Robert Brown, at the meeting of the Largo Field Naturalists' Society, which was held last August at Elie, in Fife. This plant presented a thick, tender, leafy growth, of about 3 feet in height, in the last week of April, when it decidedly surpassed, in bulk of crop, the grass then growing in the neighbouring famed sewerage irrigated meadows of Edinburgh. So that, as a highly productive, early cutting grass, it ranks far before any other known kind. A plentiful crop of ripe seeds was reaped from the fertile stems in the first week of September, by which time several of a thick intermingled growth of leafy or barren stems (fig. 1) had attained to about the same height as the seed-bearing ones, while the others of these were of various intermediate heights. All the stems, as well as foliage, changed from a greenish to a brown withered-like colour, by the second week of November.

The following analyses of both the seed-bearing and leafy stems have been made by Professor Anderson, Analytical Chemist for the Highland and Agricultural Society of Scotland—who stated in an accompanying note:—

I enclose analyses of the two samples of Bunch Grass. They have not so high a nutritive value as

B



The Sugar Cane (*Elymus condensatus*), shewing habit of growth.

linary hay, which contains twice as much
ous matter, and rather more oil.

that, even when apparently dead and dry
stock will become fat on it, and remain so

	Leaf-bearing stalks.	Seed-bearing stalks.
.	14.84	18.29
.	1.71	1.36
ious compounds .	4.44	3.62
e, gum, &c. .	48.21	41.93
.	26.61	30.65
.	4.19	4.15
	100.00	100.00
n .	.71	.58
ish contains—		
ates .	.39	.15
oric acid combined		
alkalies .	.21	.19
.	2.15	1.95

, yours truly, THOMAS ANDERSON.

rough the above analyses do not
so high a nutritive value as that of
ordinary hay, this must not be deemed
catory of this Bunch Grass, seeing that
samples were cut in October, fully a
after the seeds were ripened; whereas
s generally contain most nutriment
cut immediately after flowering.

cultivating the British Columbian Bunch
we would recommend sowing it in
or beds, allowing it to grow there for
st one season, and then transplanting it
l-cleaned and drained land, at distances
to 15 inches apart. The seedlings
but little growth, and never run to seed
first season. Hoeing or weeding will
ore be requisite throughout the first
er and autumn after transplantation;
fterwards the plants will be sufficiently
to overpower most kinds of weeds.
hey will seemingly grow on in full vigour
ong series of years.

sequent to our fore-mentioned notice of
unch Grass, we have received the follow-
rticulars regarding it in its native habi-

In a paper on the Flora of Alaska—
rly known as Russian-America—which
red in the Smithsonian Report for 1867,
iter, Dr Rothrock, states that the high
ds in the vicinity of Fort St James (lat.
3. 1 min. north) afford the Bunch Grass
us) of the packers. So nutritious is this,

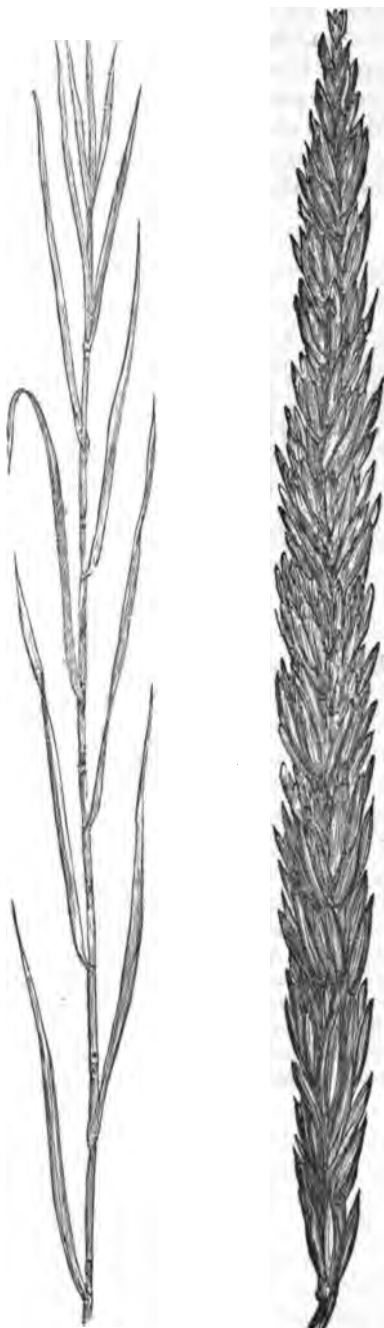


Fig. 1.—Leafy or barren Stem.

Spike, natural size.

under hard work for long periods, if this be
plentifully supplied. In a recent Californian

newspaper, a correspondent mentions that in the vicinity of the Boise Basin, in Idaho Territory, "the Blue-top Bunch Grass" covers the hills, and is as good as hay, some even considering it as approaching, in its nutritive qualities, to grain. There may, however, be some doubts whether one of the other Bunch Grasses formerly referred to, and not the *Elymus condensatus*, may be that here noticed.



Spikelet, magnified.



Seed, natural size.

But the most recent reliable and important information regarding it is contained in the following letter to Mr Robert Brown, of the British Columbian Botanical Expedition, from a friend who lived for several years in the Bunch Grass country:—

Lyneal, Ellesmere, 9th Sept. 1869.

DEAR SIR,—You ask my opinion of the Bunch Grass of the central plateau or table-lands of British Columbia, *Elymus condensatus*, as I believe you botanists call it. After a five years' experience of that country, I can bear testimony to the nutritious and fattening properties of this grass, far surpassing, I believe, those of any other known herb. A few facts will abundantly illustrate this.

In the early part of the season, before oats or bar-

ley had been imported, this Bunch Grass was the only (as it still is the principal) food of the trains of mules and horses which, heavily laden with provisions and goods, followed the gold-diggers into the mines, over the roughest possible trails. I have ridden hundreds of miles on horses whose sole support was this Bunch Grass. Turned loose at sunset, when the camping-ground was reached, to feed, they were found next morning as fresh and gay as ever. Indeed, on such a journey, if not ridden too hard, they would rather gain flesh than lose it.

In my "Essay on British Columbia," page 40, I have spoken of the marvellous increase of stock in that part of the country; an increase, owing, I believe, mainly to the amount of vital energy imparted by this herb.

Then, as you are aware, the droves of cattle which supplied beef to the mines of Cariboo, had been driven 600 miles from Oregon, yet they were in excellent condition on their arrival, owing to the excellent pasturage, which refreshed them each night after the journey of the day.

Finally, both horses and cattle used to survive winters of great severity; so long as there was not too much snow for them to paw aside, they could subsist on what tufts of Bunch Grass they could reach. It must have been hard times for them, but they managed to survive.

I am rejoiced to hear that the experiment of trying this grass near Edinburgh has succeeded so admirably; and I trust agriculturists may be induced to try it on a larger scale, as I am convinced farmers and cattle-breeders would soon learn to appreciate its muscle-making and fattening properties.—Believe me, dear Sir, yours very faithfully,

R. C. LUNDIN BROWN, Vicar of Lyneal, Salop.

A very distinct variety has been raised in the Edinburgh Royal Botanic Gardens, which may be named *Elymus condensatus compactus*, from its spikes or ears being much shorter and broader than those of the original form; bearing, in fact, the same relation to the latter that the ears of the *Triticum compactum*, or Duck's-bill wheat, does to those of the common beardless wheats.

The Farm.

ROUGH CULTIVATION IN RELATION TO THE TEMPERATURE OF FARM SOILS.

SUMMING our remarks upon this subject in connexion with the cultivation of land, and reverting to the important point added to at the conclusion of our first paper, namely, the injurious effect of the use of horses on land deeply stirred and left with a finely mellowed surface at the surface, Mr Greig points out that where land is worked by horses "every foot-mark will break up the subsoil, and leave a place for the collection of the water and its accumulation in pools under the surface." When this is the case, it must be clear to every mind that the temperature of the land will be seriously affected, and that the roots of the crops will be unable to avoid those places which are thus broken up. It is of the utmost importance that the land should be kept as even as possible, and should be kept at as even a temperature as possible, which cannot be the case where horses' foot-marks exist. Having pointed out the evils arising from this, Mr Greig states, that having prepared the land and sown the crop entirely without the use of horses—thus taking the best advantage of avoiding the treading of the soil—it is found that the work of the succeeding year will be done with one-half the power which would be otherwise required, the land being throughout in uniform condition, free from pools. This working the land and leaving the green crop seed without the use of horse power, does not prevent the soil after cultivation in the way of ploughing the soil and hoeing the land between the plants, only provided this be done when the soil is dry, not in a wet condition. Mr Greig points out very forcibly the importance of never working heavy lands in a wet condition, stating that if it is not

worked in this state, three-fourths of the cultivation required under the opposite system will be saved. Indeed, nothing, he says, can be worse than cultivating clay land when wet, and that he has seen land so cultivated not able to recover the treatment for years—an opinion, or statement, which we can most heartily endorse. The general opinion, however, that certain crops, as the cereals and clover, require consolidated soils, must not be overlooked; but this consolidation can be secured without trusting to the action of the horses' feet, which some advocate as the best mode of securing consolidation, in conjunction with rollers. And on the use of these, and of the clod-crusher, Mr Greig has a suggestive remark, that they serve no good purpose in the cultivation of heavy land; and that the best cultivation of such is obtained by subjecting the soil to the ameliorating and pulverising influences of the atmosphere. Several years ago this view was promulgated by Mr Henry Stephens, in his little book on the "Yester Deep Land Culture."* It is in view, indeed, of the very remarkable effects induced on the soil by proper cultivation only, that we foresee the coming of the time when all the complicated array of implements for the pulverising of the soil will be superseded by simple modes. This opinion we have long held. As a means of getting the perfectly even and consolidated bottom, Mr Greig advocates shallow ploughing, merely scratching the surface, loosening no more of the top soil than is merely necessary to cover the seed. Of course, in this procedure

* Blackwood & Sons, Edinburgh.

it is understood that the land has been prepared in the way we have already described. This system of merely scratching or combing the surface of cereal or clover crops, will, in the opinion of Mr Greig, be "found to be of much greater importance than at present anticipated, and will tend considerably to lessen the number of operations required in cultivation."

Coming now to light soils, and it is to be remarked that the effects of deep cultivation are more quickly observable than in heavy soils, Mr Greig attributes this to the scarifying and breaking up of the "pan" which is frequently met with in lands of this class, which enables the roots to spread, and to allow also any excessive supply of water to pass away freely. Thus the soil retains a "proper temperature for a longer period, and the plants penetrate much deeper than otherwise would be the case, thus receiving proper moisture for a greater length of time." Light land requires to be deeply loose and aerated, but its very nature gives it a tendency to close on the surface. To obviate this, a continuous succession of crops should be taken from it. Dr Voelcker remarks, that the roots of an acre of clover are equal in manurial value to 8 cwts. of guano; and if so, we can see the benefit likely to be derived by having the land constantly occupied with crops. A difference of opinion exists as to whether cultivating or ploughing is the best for light land. Mr Greig is of opinion that the plough is required to deal with the surface, but with the surface only—that is, in no case should the depth to which it goes exceed 4 to 5 inches. Where the land is clear in the sowing of the cereal crops, the

mere scratching or combing of the land is all that is required, that is, supposing the surface has not been trodden down by horses. This mode of treatment secures a solid foundation for the roots, while, at the same time, there is no "pan" to arrest the downward course of the roots. There is no necessity for the soil being deeply stirred for each crop, as, by the mode named, the land is brought and kept in condition fitted for the healthy development of the plants. Mr Greig believes the practice, which is largely followed, of manuring for more than one crop, is a mistake; he strongly recommends that each crop at the time of sowing should be manured, for this gives the stimulus to the young plants at their first start, which ultimately develops the plants. There can be no doubt that where the plants get a good start and fairly get hold of the soil, their after growth may be pretty well reckoned upon to be good. The following is a brief summary of the points which Mr Greig—and he has, unquestionably had very large experience—insists upon: First, that deep cultivation is necessary, and deep ploughing injurious; second, that the soil should be exposed to the weather, and that it should only be worked in dry weather; third, that one-half of the labour will be saved by avoiding the treading of the land by horses; fourth, that deep cultivation maintains an even temperature in the soil, which is more essential than an even temperature in the air; fifth, the early development of plants is of importance; sixth, that in heavy land those crops should be cultivated which have a large amount of roots; and seventh, that in light lands, crops giving a large amount of leaf surface should also be cultivated.

SURFACE DRESSING OF MEADOWS AND PASTURES.

ing the practice of some of the best
ers to apply manurial substances to
s lands at the present season as the
d, we propose to glance briefly at a
he points connected with it. We
l that it is the practice of some
manure to grass lands at the pre-
on ; others, however, do not agree
holding that the early spring is the
e. We, however, believe that the
of rough manure, that is, farm-yard
compost stuff, at this season is a
ctice, inasmuch as the manure has
a longer period to act upon the land,
manures, in their usually rough condi-
beneficially as a shelter to the tender
ring the severe weather of winter.
lter is all the more required when
es have been closely eaten off by
the summer and autumn ; thus ex-
a very great degree the tender
hich are especially liable to being
ly destroyed by the frosts—frosts
ure the coarser grasses. We remem-
ome years ago a series of experiments
e to ascertain the effect of sub-
such as straw thrown roughly over
ce of the land, in raising the tem-
we do not, however, remember the
ut only this, that the effects were
arkable. The use, therefore, of
essings at this season we believe
ghly beneficial. The best dressing
ures is, therefore, ordinary farm-
ig. This should not be old, but,
: materials of which it is com-
a fresh condition. As we have
re, the dung thus applied at the pre-
on is also beneficially applied, as the
have the longer period to be under
ence of the manure. We are well
f the objection which has been
the plan of exposing manure to the
f the atmospheric influences, and
ly it cannot be an economic practice
t valuable manure to lie bleaching in

the sun, and blown over by the winds. Still,
the manurial substances will be rapidly
absorbed by the soil, more especially if there
be much rain ; and, at all events, this fact is
worth noting, that where the practice is fol-
lowed, as followed it is by many, it has been
always crowned with success, and it is one we
have adopted in our own practice. The young
and tender rootlets, being thus at once pro-
tected and nourished by the manure, will
send up new and vigorous shoots in spring,
and give a close and healthy crop. Where
farm-yard dung is not to be had in sufficient
quantity, the supply of manure may be supple-
mented by the compost heap. We refer our
readers to what we have said on this in
articles which have appeared from time to time.
Although this may be—should be, for the
reasons above named—in a rough state, it is
necessary that all stones should be carefully
taken out before being applied to the land,
this more especially if the land is meadow.
The addition of salt and lime to the
compost heap will, in the majority of
soils, be of great service. The salt in strong
lands, where twitch grass abounds, will tend
to kill this pest, and the lime will act as a
medium to make the manurial substances
soluble, and also tend to promote the growth
of the finer qualities of grass. Some advo-
cate the addition of artificial manures to the
compost, but these will be better applied
separately in the spring, when genial showers
and milder weather have taken the place
of the cold rains and frosty winds of winter.

Of all the artificial manures to be used as
spring top-dressings, we think most highly of
nitrate of soda. This seems to have a re-
markable influence in killing the bad and
in promoting the growth of the good grasses.
If bone dust or broken bones be applied to
lands which are likely to be much deprived of
their phosphates, by long continued grazing
of dairy cows, they should be applied at the
present season along with the dung in the
compost heap stuff.

GRASSES AND NOT GRASSES.

IT seems a bold statement to make, that "at least one-third part of our grass land is occupied by actual weeds; that another third part consists either of noxious or nearly worthless varieties of natural grasses; and the remaining third part, of a promiscuous mixture of a better class of grasses—such as the locality in which they happen to grow, or the shops of the seedsmen may furnish." And yet this is the deliverance of one who can lay claim to being an authority, at least of one who has investigated the subject of grasses, their varieties, habits of growth, and value as forage, in a way that few, comparatively, have had either the leisure or the desire to do.

If this statement—not by any means flattering to our good pasture or meadow farming—is only to a certain extent true, it conveys with it the idea of so much loss to the country, that the whole subject is worthy of the fullest investigation. In one department, the getting rid of the weeds which infest pasture and meadow lands, we have already, in more than one article, given some hints which may be of value, and to which articles we here refer, only adding these two remarks, that although the labour seems to be very great which the getting rid of worthless weeds involves, still the labour will unmistakably pay. Further, we believe we have yet a vast deal to learn in connexion with the influence of certain manures in getting rid of weeds. It seems, in fact, to be certain that there are manures which kill weeds and encourage the growth of good grasses. Would it not be well to ask, be a task worthy of some, if not of all, of our leading agricultural societies, to constitute a series of experiments to endeavour to obtain as a result some knowledge of the facts of the case here put? We have no desire to ignore the importance of prizes for

stock; but does it not seem a matter of some importance to be able to increase the number and the value of the grasses upon which that stock is fed? There can be no doubt that the subject is one of large importance, and which demands and should obtain that notice which it has not yet received. It is pretty well established, that from amongst the wide variety of grasses which grow upon our meadow and pasture lands, only a few, and very few, are really valuable; while of the others, the majority, although innocent, or rather useless, there are some which are positively injurious.

The capability of being able to distinguish the best amongst the good, and the comparatively worthless from those which are positively bad, seems undoubtedly of high value; but we fear it is not within the reach of general practitioners, when we consider that even botanists are sometimes placed in straits in distinguishing the "different genera, species, and varieties." Some, who are indeed distinguished, have made, if they do not now make, some remarkable blunders, or, at all events, mistakes. It seems a pity, we confess, to have to come, therefore, to the conclusion that in this direction of knowledge, there is little hope of the general farmer being able to do much. He evidently can do more in cultivating his land in such a way that it is put under those conditions in which the growth of the best grasses is aided, while that of the worst is retarded, if not altogether stopped. And it is consoling to think, notwithstanding the great difficulties which surround this department of farming, that in this direction of labour a vast deal can be done. In the preparation of the land, in the keeping it clean of weeds, and in the use of manures, the farmer has a power which he will find of immense advantage to him in promoting the

th of the most valuable grasses. Of three directions for practice, we believe second, that is, the getting rid of weeds, to be of vast importance; and of the third, we here repeat what we have more than once said, that we have yet to learn the

effect which different kinds of manures have upon the growth of grasses; and we conclude by expressing a hope, that the lessons which we may get in connexion with this, will soon be authoritatively placed before us in the way we have indicated.

LIEBIG ON FARM-YARD MANURING.

REFERRING still further to the Saxon experiments alluded to in our article last month, a point worthy of notice in connexion with them is the difference observable in the permeability of the soil to dung constituents in the different localities. Thus, in some soils the constituents of the dung are arrested in the upper layers, while in others they descend to the lower layers before they stop descending. Thus, in one of the Saxon fields the clover crop had received little or no benefit from the farm-yard manure, whereas in another field the application caused an increased produce equal to and in another to 200 per cent., thus showing that in the soils of the latter the dung constituents indispensable to the clover had penetrated much deeper in the latter fields than in the first-mentioned field. Thus, in certain fields, layers of soil will be found much richer or much poorer in certain constituents than other fields. For example, the field which gave so great an increase of the clover crop gave a great increase in the oats, indicating that certain constituents made their way to the layer in which the roots of this cereal draw their supplies of food; and this layer, being richer in grain and straw constituents than the upper surface of arable soil, permitted a small portion of nutritive substances to pass through and escape from it, and to reach the clover. Without passing altogether this point of permeability of soils, enough has been said to shew suggestiveness, and how, in the words of Liebig, "it is easy to see that by knowing the absorptive powers of the arable soil," the farmer

is enabled beforehand to determine "to what depth the nutritive substances applied in the manure will penetrate into the ground; and it follows, as a matter of course, that he is able to apply, with greater effect, the mechanical means at his disposal for promoting the distribution of those elements in the soil, in the right places, and in the proper manner."

We are now prepared by what has been given in these remarks, and also those in preceding papers, to consider those changes which are brought about in the composition of soils by the system of cultivating them on the farm-yard manure system. By the cultivation of the cereal plants, the upper layers of arable soil, from which their roots chiefly derive their nutriment, are deprived of their manurial constituents, which must be restored by the application of this manure, in order to maintain the fertility of the soil. This maintenance is effected through the system of cultivating what are called fodder plants, which derive their constituents from the deeper layers of soil, to which the roots of the cereals cannot, or do not, under ordinary circumstances, penetrate; these plants being consumed by stock either in the field or in the steading. This system yields manure in which those constituents are present, less a small percentage which remains in the systems of the animals which have been fed upon them; but this manure, as we have shewn in other articles in this Magazine, contains a very large proportion of comparatively useless matter, at least that which is not immediately assimilable, this matter being chiefly made up of the straw which has been used for littering

the animals. As the farm-yard manure thus made is, as a rule, returned to the soil from which the cereal crops were raised, the soil at the outset of a new rotation is "as rich as before in the conditions for the production of straw; and there exists no ground for a diminution of the straw crops."

We have said above that only a small percentage of the manurial constituents of the fodder plants is retained in the animals which are fed upon them, but this is only true of the full grown animals; the case is different with the young cattle sent to market, in the wool of the sheep, and in the milk, butter, and cheese sent off the farm. These cause a loss of phosphoric acid and potash, which may be estimated at ten per cent. But the remaining nine-tenths are returned to the soil; hence the upper or arable surface of the soil is richer at the outset of a new rotation, in the constituents of the fodder crops, than it was before, inasmuch as those have been brought up by these fodder plants from deeper layers, not usually reckoned as part of the arable soil. But we find that the greater portion of the constituents thus restored to the soil do not penetrate to these deep layers, but are arrested in the upper layers; hence it follows that the productive power of the lower layers, or "fodder layers," as we may term them, are lowered, and are not restored by the continued application of farm-yard manure. The constituents of the fodder plants which have been retained by the animals fed upon them being nearly identical in quality, and nearly equal in quantity, with those of the cereals, the loss sustained by the soil under these circumstances may be estimated "as equal to the corn crops, *plus* sold, the corn constituents which the fodder plants have given up to the animals on the farm." From this it will be seen that if the corn producing powers of a soil are to be maintained under such circumstances, the substances from which the corn derives its nutriment must be restored to the soil.

It will thus be seen, that if farm-yard manure contained only those constituents required by straw and potatoes, and only these, any appli-

cation of it could only restore the productive power of a soil, so far as the straw and potatoes were concerned, but would not effect the increased produce of the grain. With the application of the manure under such circumstances, the soil would be as rich as ever for straw and potatoes, but would be poorer for the grain, to the "extent of the whole quantity of corn-constituents taken away in the crops." Hence, to restore the grain constituents, the farm-yard manure applied must contain as much, or rather more, of the grain constituents as have been taken from the soil by the crops; and the amount of corn elements in the manure is dependent upon the sum of those passed into the manure from the cattle which are fed upon clover and turnips. Now, if this supply of corn elements exceeds the loss sustained in them by the soil, the soil is, in consequence, made richer in corn elements; and it is also made richer in those elements which will give increased produce in straw and tuberous plants. "Where, therefore, the farm-yard manure (by the clover and turnip constituents in it) increases the amount of phosphoric acid and nitrogen in the arable soil, it increases in a much greater proportion the quantity of potash and lime, and to some extent also that of silicic acid; and since, as already stated, the whole of the straw constituents removed from the field are brought back to it in that manure, higher crops of corn, straw, and potatoes, are the natural results." But there is in all fields a certain appointed limit to this increase in the produce of farm plants, which derive their food chiefly from the surface soil under arable culture. But the time approaches, sooner or later, according to circumstances, when the subsoil, drained, so to speak, continually of its combined stores of phosphoric acid, magnesia, lime, potash, &c., begins to lose its power for producing the elements required by clover and turnips; hence the upper layers of cultivated soil begin to be poor in elements, as these are taken away from it by corn crops, and which are no longer replaced, in consequence of the store in the

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soil is sustaining, or has sustained,
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t of the constituents. The normal
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the nutritive substances accumulated
in the arable soil, which are set in
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f his land will admit of their cultiva-
ntroduces sainfoin and lucerne, the

roots of which penetrate still deeper into the
subsoil than the plants which have failed
him, and which, therefore, draw their supplies
of food thence. Consequent upon these
“improvements,” the produce is increased,
fresh nutritive substances are brought up
from the deeper soils, which may possibly
accumulate in the surface soil ; but these
deeper sources will in turn become exhausted,
and then, in turn, the accumulated store in
the surface soil. This, says Baron Liebig, is
“the natural termination of cultivation by
the system of farm-yard manuring.”

Baron Liebig draws pointed attention
to the results of the experiments with
three fields on the farms alluded to, as
shewing the “effect of a pure system
of farm-yard manuring, from which is ex-
cluded all supply of manure extraneous to
the farm itself ;” and says that it is self-
evident that we cannot give more farm-yard
manure to a field than itself produces, unless
we take the constituents of the manure from
some other field, which, in that case, must
lose just as much as the former field gains.
To this last observation we draw the special
attention of the reader, as it conveys a truth
which is very often lost sight of in the dis-
cussion of the question of the exhaustion of
the soil—on the truth contained in it, which,
to use the Baron’s words, we may say, is
self-evident the moment it is named, the
whole of Liebig’s views may be said to depend.
If we purchase hay from another farm, or
other food, this is evidently equivalent to
an additional supply of manure. If we ex-
amine manured fields we shall find that
though they give larger corn crops, and prob-
ably larger clover and turnip crops—the
arable soil losing more by the removal of the
corn crop, and receiving more back by the
increased produce of farm-yard manure—the
ultimate results are still the same. If the
application of farm-yard manure was capable
of rendering land permanently richer in the
food constituents of plants than it is natu-
rally, it is obvious, or at least it would be
reasonable to expect that during the time in
which the manure was applied, there would be
a steady increase in the crops. But experience

of the past has not shewn this to be the case. Few farmers who practise the system of rotation, and depending exclusively upon the application of farm-yard manure, can say that he has thereby "increased the power of bearing crops." At best he only maintains this, and only apparently, for the time comes, as we have shewn how Liebig proves that it must come, when the effects of exhaustion will unmistakably shew themselves. "On the average, it may be stated, as the result of my experience of the above system of farming, that, while the straw crops have increased, the corn crops have diminished;" and that money has to be paid out to purchase manuring substances extraneous to the farm—manuring substances which were thought to be "produced" on the farm, but which it is now begun to be perceived, that though they may be "produced" for a time, they cannot be reproduced in perpetuity. In truth, a very simple law of nature regulates the permanence of agricultural produce: "if the amount of produce is in proportion to the surface furnished by the sum total of nutritive substances in the soil, the permanence of the crops will depend upon the maintenance of that proportion." The law of compensation—the giving back to the soil the elements of plants which these plants have taken away from it—is the "foundation of rational husbandry." To manure a field which already is possessed of an excess of plant constituents, is quite opposed to this "rational system of husbandry, for no good end would be gained by increasing those elements in a field in which a portion of the elements already existing cannot, on account of their mass, come into operation." But it is useless to talk of excess when manure has to be used, for, to keep up the produce of our fields, if not given, we have to witness their decline. The notion that the soil contains an inexhaustible store of the elements of food is due, as Liebig, "partly to the excellent quality of the land," but also to the skill in which it is robbed. "The man," he says, "who attempts to gain money by filing the weight of the gold piece from a thousand cannot plead in extenuation that it is remarked by no one,

but if discovered, he is punished for everybody knows that the fraud repeated a thousand times, would leave nothing of the gold pieces. The law, from which, moreover, there is no escape, punishes the agriculturist who would believe that he knows the exact amount of available food elements on his land, and how far it will go; and who deceives himself by fancying he is enriching his field by taking from the arable surface soil the manure from the deeper layers."

A notion is very prevalent that all that is necessary to do is only to restore to the land certain substances without concerning ourselves as to the rest. The foundation of the vicious system arises from this notion, and what is altogether erroneous, is, as Liebig, "a total misconception of the condition of the soil, the condition and composition of the soil, which presents an infinite variety of cases. For example, some fields which are rich in silicates, lime, potash, and magnesia, being deprived, by the growing of crops, of nitrogen and phosphoric acid, and the replacement of those only that are lost. The farmer, in such cases, directs his attention to the replacement of those only that are lost. But it is utterly wrong to suppose that the circumstances are such that the soil is poorer. In such fields, it is therefore right to conclude that they are the same in all others, and that in the same manner, only necessary to add such substances as phosphate of lime and salts of ammonia to replace the phosphoric acid and nitrogen taken away by the corn crops; whereas, in other fields, that other fields do require silicates, potash, lime, and magnesia. Liebig points out, that while a farmer may be perfectly justified in believing that his fields do not become poorer, because he does not take this material from them, or because the soil actually becomes richer in this material, as every year his farm tends to accumulate in the accessions of it, it is "childish" for him to believe that he is right in trying to enrich another farmer, of the nature and qualities of the soil of his farm he is ignorant, that he requires no potash. For immense tracts of land, good and

which the proportion of lime or magnesia does not exceed that of phosphoric acid, so that both must be replaced, and there are immense tracts also, which, like calcareous soils in general, are poorly supplied with potash, and become sterile unless this be supplied; while, on the other hand, there are immense tracts so rich in nitrogen that it is simply a waste to supply it. Thus, where clover is grown in fields abounding in potash, manures containing phosphoric acid will increase the crop, while ashes will not; but ashes will promote the crop when applied to land in which potash is deficient, and where bone earth is useless. And in fields deficient in lime and magnesia, clover will be a good crop if supplied with lime containing magnesia, where without it it will be a failure.

The nature of the manures which supply the mineral elements of crops depends upon, or is modified by, the style or mode of farming adopted; as, for example, when a farmer, in addition to rearing stock and growing corn, sells and grows other produce. Thus an average produce of potatoes from, say 8 acres, carries away from the soil the seed constituents (not the straw constituents) of four wheat crops, and, in addition, about 600 lb. of potash; and the turnips of the same extent of land carry off the seed constituents of four wheat crops, likewise about 1000 lb. of potash. Phosphoric acid supplied alone will not keep up the productiveness of the land. It is imperative, therefore, that the farmer must attend strictly to the "law of restitution, which, properly interpreted, does

not imply that he should bestow the same anxious care upon the replacement of all constituents alike, which have been taken away in the crops." Each case must be studied carefully by itself; and this truth we have in these pages again and again insisted upon, that what is suitable for one soil and locality is not suitable for another, which, indeed, is evident enough, if one would only consider the results of a practical experience which are as diverse as may well be. In connexion with this, Liebig has a sentence pregnant with meaning—"A careful study of *the weeds* that spring up spontaneously in his fields may frequently prove more useful than a heap of handbooks on agriculture." . . . Baron Liebig, in concluding his remarks upon the system of farm-yard manuring so generally carried out, and so highly esteemed, gives some very striking facts and remarks in proof of the evil results it exercises upon the condition of farming, and the gradual decrease in the average of corn crops in Prussia and Bavaria, results which, he believes, a strict inquiry would shew to be the same in France and England, and thus concludes:—

The visible gradual deterioration of the arable soil cannot but command the serious attention of all those who take an interest in the public welfare. It is of the utmost importance that we do not deceive ourselves respecting the danger indicated by these signs, as threatening the future of the population. An impending evil is not evaded by denying its existence or shutting our eyes to the signs of its approach. It is our duty to examine and appreciate the signs; if the source of the evil is once detected, the first step is thereby taken to remove it for ever.

FLAX SEED GROWING.

TIME changes, and with it the position of public questions. At a period during the last 50 years, before free trade was, before the cotton famine was, before the population of these islands were thirty millions, the question of growing flax in England was submitted to the landowners and farmers of this country; and the first opposed it by restrictions in their leases, the farmers opposed it by figures, shewing other crops were more easily grown, and more profitable—or they at least thought so. Now, as we purpose to review, in a series of articles, the present bearings of the growth and supply of different seeds, we may initiate the inquiry (inviting correspondence on the subject) by asking, whether seed growers should not now turn their attention to the growth of flax? An advocate for its culture states that the flax farmer may realise a profit of £20 per annum off the acre—say double the profit of growing wheat. Why, then, is it that, with the exception of a few fields in Norfolk and Somerset, in Scotland, and near Belfast in Ireland, we do not meet with the beautiful blue blossoms that mark a field of flax? The spectacle early in the present century was not uncommon in East Kent, and, indeed, in many other counties; and a sound statistician estimated twelve millions sterling was absorbed in the British linen trade some thirty years ago. In 1852, there were 43,000 persons engaged in the trade in Great Britain, and then the linen produce was reckoned as worth £8,000,000 per annum. Through several stages of decline this staple passed, through the overwhelming cheapness and opposition of cotton, until the American war drove up that staple to a point when woollen and linen fabrics once more came into favour.

Putting aside, however, the rival claims of cotton and linen, the growth of linseed, for its seed and oil, demands earnest considera-

tion. The fact is too well admitted to demand argument, that whilst other countries can grow and forward wheat to our English markets, and undersell home produce (as was the case last autumn), yet the ever increasing demand for beef and mutton, and consequently for the cultivation of cattle roots, must always secure to British bred and reared stock an advantage that no foreign country can possess. The cost of transit by rail and sea of live stock will always continue a *protective duty* on the side of the British farmer, and all practical agriculturists admit this fact, if they do not go so far as Mr Mechi on the subject. Running parallel with this demand for butcher-meat and roots, is the yearly increasing consumption of oil-cake and of manure. In the newspapers of the past month we are told the supply of guano is assuredly diminishing, whilst Mr Howard's paper, read at the Farmers' Club, declares oilcake dust, or crushed cake, as a manure, to be of the highest value. What then, should be our conclusions? That seed growing in England, where the soil and climate are suitable, should be largely followed. An immense demand already exists. Last year we received from abroad 1,625,518 qrs linseed, of the estimated value of £4,348,224 an increase of about *one-fourth* on the preceding year; whilst of oil-seed cakes the value was returned at £1,391,582, or nearly *one-third* increase on 1867. In rough numbers, whilst cake may sell for £12 per ton, its value as manure is about £4, which is returned to the soil. In the annual report of the linseed trade at Hull it was recorded, "The business in this important branch of the trade of the port has this year (1868) attained gigantic proportions, the imports from direct port being thirty-five per cent. in excess of the previous year, and the stock in hand is estimated at 230,000 qrs., against 96,000 qrs. last

year." For the first nine months of the present year we have imported—

	1868.	1869.
Oil-seed Cakes	Tons. 95,029	109,858
Flax Seed	Qrs. 972,841	769,128

Thus we clearly see there is a large market for seed and cake, even if the cultivation of flax for its valuable fibre was not a prime consideration, standing even before "the graziers' calculation, that linseed cake is in its nature the quickest article that can be manufactured into beef, being, in fact, concentrated ready for immediate transformation into the living organism." If we take London alone, the weekly requirements, 5000 qrs., are just about the same as of British wheat. There is also encouragement in the Irish Agricultural Statistics, issued last August. In the province of Ulster (where 211,044 acres are under flax, out of the 229,178 acres of all Ireland), the increase of acreage in the year is 18,814 acres, employing 142 scutching mills.

In 1851 there were 140,536 acres.

" 1861	"	147,957	"
" 1869	"	229,178	"

Whilst from 1863 to 1867, the extent of land was raised up to over 300,000 acres, this increase being owing to the high value of cotton, a fluctuating level; whereas the demand for meat and of cake is perhaps more regular than for any other market article. There is a further strong motive for cultivating flax in the number of labourers it employs; the produce of one field of 3 acres in Ireland having been known to occupy more than 200 persons for an entire year—of course, including those engaged in the manufacture of the fibre.

What hop gardens would be without oast houses, giving, with their cowls, a rustic homeliness to our Kent and Sussex landscapes, so would flax fields be without their neighbouring "scutching mills." Indeed, this material and very simple obstacle, the want of mills, is the chief stumbling-block to cultivation. Farmers, now-a-days, and especially seed growers, are not made of the obstinate and stupid stuff that made the boors of former generations, but having practical knowledge,

combined with scientific education, modern agriculturists are able and willing to pursue whatever culture promises them the best reward. Seed merchants, as is well known, often send stock seed to farms in the country, and except visiting the fields when the turnip or other plant is in flower, they do not see the seed until the grower is ready to deliver it to them, at an agreed charge for land and labour. So far this is an easy and convenient method, and could it be carried out with linseed, we should not probably have any need to buy of the foreigners. But, like hops and the oast house, flax, directly it is pulled, is usually (although sometimes stacked) sent to the scutching mill, and until some large seed firm, or flax association, plants mills in suitable districts, no great increase of flax culture seems likely, unless, indeed, its decided advantages prompt a leading farmer in different neighbourhoods to build a mill, and scutch for other growers besides himself, just as the owners of oast houses dry hops for their neighbours. Besides the fibre, the seed, and the cake trade, the quantity of oil crushed gives value to the different sorts of seed grown, and, it is said, that English seed is deficient in oil. Probably this objection might be removed by better selection of seed samples. The best kind of flax shipped at Riga, the great port of the Russian trade, is called Druana rakitzer, and its threads are long, fine, and white; and this is branded, like hops, with date and other particulars, whilst great care is given to choosing sowing seed which should be oily to the feel, heavy, and quite fresh. Dutch seed is thought to produce the heaviest crops, and ripens early, yielding a fibre much liked by manufacturers. American seed produces fine flax, but it is smaller than the Dutch. Crushing seed is principally brought from Russia, Germany, Holland, Egypt, France, and the United States, Canada furnishing a quota; whilst, from the East Indies, large bulks come regularly.

The *Montreal Trade Review*, referring to the cultivation of flax in Canada says:—

"For the past two years we have heard comparatively

little about flax raising in Canada, and not a few were beginning to think that the enterprise might prove a complete failure. The years 1866 and 1867 were, undoubtedly, bad ones for those engaged in this occupation, whether they simply performed the part of the scutching, or manufactured the raw material into linen, ropes, &c. Not a few losses occurred, and several large manufacturing which had been erected and fitted up with machinery at a very heavy expense—much of the machinery having to be imported from Great Britain or the United States—not only stopped work, but in some cases the machinery was sold off at a sacrifice, and the enterprise abandoned altogether. These ugly facts led many to think that the culture of flax by our farmers would be almost entirely given up; and, we confess that we ourselves feared that would be the result; but having travelled recently over a large portion of the leading railways of Canada, we were surprised to see so many fields of flax from the car windows. On the Grand Trunk Line, in the neighbourhood of Stratford, we saw field after field, the appearance of which was all that could be desired. In some fields we saw as many as twenty men, women, and children engaged in pulling it by hand, which requires to be well and carefully done. This season seems to have been quite favourable for flax, and reports go to indicate that the yield is excellent. We hope the prices may also be such as to pay the farmer for its cultivation, for it is a crop which affords a great deal of employment to working people. We have little doubt—in fact, we feel certain—that in localities possessing the proper soil, flax raising will pay well.

Labour may be too high here to enable us at present to compete with foreign manufacturers of flax, but we feel assured that its cultivation, and we may add, also, the process of scutching, can be made to return good profits. We have been informed that both growers and scutchers did well last year—in some cases, it is said, unusually large profits were made. The prospects up to this time are very good for this season, and if the scutching mills make as handsome returns as last year, we doubt not the culture of flax will soon receive as much attention as ever. The greatest difficulty in the way of our farmers entering into flax-growing largely, is, that the crop is rather a troublesome one. The hand-picking is disliked—it seems so slow when compared with the way a reaper slashes down a field of wheat. After a while, when the farmers become more accustomed to flax, we hope to see less attention given to these objections, and the extent and quality of our annual flax crop once more gradually increased."

Letters from New Zealand speak favourably of the cultivation of this staple, and as a paying crop in England, we have lately examined several growers' returns; and after allowing for rent, tillage, seed, watering, threshing, and scutching, a profit of from £15 to £30 per acre is promised to growers who are willing to make themselves practically acquainted with flax cultivation.—*From the Seedsman.*

ON THE PRESERVATION OF FLAX SEED IN IRELAND.*

BY GEORGE ORME MALLEY, ESQ.

THE value of flax seed annually imported from the Continent into Ireland, constitutes such an enormous drain on our capital, that any means by which this could be stopped, or sensibly diminished, would confer a great advantage on the country. The object of this paper is to shew that such a thing can be effected, and by ordinary exertion it may be effected to the value of one-half at least of the present annual expenditure, but also to shew that the farmer does not waste a vast quantity of this valuable produce for feeding purposes.

Any person who has traversed, in the

* Printed before the Statistical Society of Ireland.

months of August and September, the flax growing districts of Ireland, must have been surprised at the quantity of flax boles rotting in the bogholes and steeping places along the highways. I have myself seen the young flax springing up 6 and 8 inches high on the banks of steeping places before those young and tender plants were cut down by the frosts of winter. The prevailing practice among the tenant-farmers of Ireland at the present day is to pull the flax, carry it forthwith to the bog or steeping hole, throw in the sheaves, heap large sods or stones on the mass, and drown in the putrefying waters the rich growth of seed which clusters at the extremity of the

re. To any reflecting observer, acquainted with the value of the seed thus annually wasted, this custom appears to be actual madness. A farmer anxious to save the law for some useful purpose might as well destroy the wheat or oats which ripen in the year. The poorest are often the most improvident, and with us the most impoverished peasant seems most extravagant in this respect, and most persistently addicted to this pernicious practice.

Anxious to ascertain if the recommendations of theorists were capable of practical adoption in our cold and changeable climate, I determined in the year 1865 to put the matter to the proof, and try by actual experiment whether the climate of the west of Ireland was favourable to the ripening and preservation of the seed, a practice which I was assured had been to a small extent successfully adopted in parts of the north of Ireland, and was universal on the Continent. In the month of August 1865, I had a statute acre of flax growing "branchy," as it is termed, on a medium dry soil in the county Mayo, which, on the recommendation of the useful flax instructor, Mr Neilson, I treated in the following manner:—I pulled the flax a little later than I should otherwise have done, so as to allow the seed to ripen. I had it tied in ordinary-sized sheaves, and set it up in long stooks with the heads of the sheaves uppermost, and inclining inwards like the letter V inverted, so as to allow the air to pass unobstructed through its entire length. I did not cap the stooks—the object being to ripen the seed effectually. After the lapse of a week or ten days I removed the entire crop into the haggard, and stacked it on ordinary rearers of timber 3 feet high, surmounted by rough boards and brambles, to preserve the seed from vermin, which particularly appreciate it as a valuable article of food, and then batched the stack as you would an ordinary oat stack, and left it thus protected during the entire winter. In the following month of March I had it removed into the barn, and employed six girls to thresh out the seed with a mallet, having a handle about 3 feet in length. Each girl was supplied with a mallet

of this description, the handle being inserted at an acute angle. Standing on the butt of each sheaf the girls beat out the seed on the floor, holding the handle of the mallet very loose, so as to allow the flat part of the instrument to fall evenly and effectually upon the seed. By these means the seed was separated from the flax fibre as well as threshed out of the boles, and gathered in heaps until the entire quantity was completed, which occupied a couple of days. I then had it cleaned through the ordinary winnowing machine, using the finest of the accustomed sieves, and afterwards "gave it the wind" on a winnowing sheet, in order to cleanse it effectually from the smallest seeds of weeds. I carefully gathered the shellings or broken boles and smaller seeds, the refuse of the machine, which, when mixed with bran and potatoes, and steamed, formed excellent feeding for pigs and cows in the month of March, April, and May, when provender was particularly scarce and dear.

Apprehensive that my seed might prove a failure, and that I might lose caste among the neighbours as an experimental agriculturist, I planted an equal number of home-grown and foreign extra-picked Riga seeds in fresh earth, in two small flower-pots, and placed them on the mantle shelf, anxiously watching their respective progress in vegetation. To my great satisfaction I observed the home-grown seed springing up more rapidly and evenly than its foreign neighbour; and this immediately determined me as to the course I should pursue. I sowed three statute acres with the produce, and sold 109 quarts to my tenants independently of the quantity of light seed saved for feeding purposes. I agreed with those tenants to give them the seed at ordinary market price—payment after they saved their crop in the next subsequent October, if the produce turned out satisfactorily. Some of the cautious ones purchased half their seed in the shops, and sowed mine in juxtaposition with the foreign seed. I had thus a favourable opportunity of testing its quality by comparison in different localities, and in every instance it far surpassed the foreign seed, so much so that every one of

the tenants expressed their regret that they had not purchased all from me, and paid the price with thankfulness.

After I had threshed the flax seed in March, I re-stacked the straw until the warm weather in May, when I steeped it in the ordinary way, sent it to the scutching mill, and sold it in Belfast at 7s. 4d. a stone, by which I realised £6, 5s. clear profit, after deducting scutching expenses, transmission, commission, &c. Other flax steeped in the usual way in the same locality, and of ordinary sample, and which was forwarded by the same train, to the same commission agent, fetched in the market of Belfast only 6s. 4d. a stone. I sold the produce of three acres at 8s. a stone; but as I despatched it at intervals, and as I was otherwise engaged, I neglected to keep an account of the return of profits. But the value of the seed alone was £11, exclusive of the feeding portion, and from this return, which was by no means a large one, you may easily calculate the quantity of seed annually lost to this country.

The quantity of statute acres of flax grown in Ireland in 1864 was 301,693; the quantity grown in 1865 was 251,433, and the quantity grown in 1866 was 263,207, and in 1867, 253,105. Allowing that one-fourth that quantity was rippled, and the seed saved, you have the produce of nearly 200,000 statute acres annually lost. Computing the value of the seed at £10 per acre, which is below what my experiment produced, you have two millions of money's worth annually rotted in the bog holes of Ireland. Can anything be more startling or deplorable? These statistics are not exaggerated. On the contrary, they are much below the actual loss. The basis on which they are calculated are few and simple, and incapable of error or misconception.

In the foregoing observations, I have confined myself exclusively to the process necessary for agricultural purposes. By this method the ripening powers of the seed are preserved, by allowing it to ripen effectually

between the months of August and March, and it is more easily separated from the boles, after having been stacked and kept dry for that period. The ordinary rippling process, which is performed in the field, during the pulling of the crop, and when the boles are green, is not less important, as being calculated to preserve a vast quantity of valuable feeding material; but as the seed has not then arrived at maturity, I should hesitate to recommend it for sowing purposes in the following year, even though it may have been saved with the greatest care and circumspection. Although rippled seed may not be suited for sowing again, yet the process is so easy, and the produce so valuable for feeding purposes, that it is a reproach to the landlords of this country that they do not urge their tenantry to adopt it universally. Instructions for the rippling of flax have been printed and circulated by the Royal Agricultural Society, by the aid of their district instructors, and it would be a waste of time for me to dilate upon a subject which has been so ably discussed and explained in the valuable little treatise to which I refer. It may be said that the fibre is injured by the rippling process. This I deny. If the seed is allowed to ripen a little more than usual, the ripple will take off the boles without injuring the firm part of the fibre, and the additional ripening, provided it is not too great, will not prejudicially affect the general sample of flax. Then why, it may be asked, is this waste annually committed? The answer is obvious to those who have observed the customs and are acquainted with the condition of the tenantry of Ireland. The flax crop comes in when the turf is saving or getting home, and before the oat crop is ripe. The peasant has no rippling combs, and even if he had, he has no inclination to devote his time voluntarily to the rippling process; neither has he barns nor large winnowing sheets to collect the seed. If the weather be wet, the process must be performed under cover, as the fibre

It pass through the rippling comb when but will break short off; and the seed moulder and heat if heaped up in a damp situation. But these difficulties are easily led against, if the resident landlords go eagerly about it, and induce their tenants to steep only half their crop to meet immediate wants, and stack the rest in March. I despair of inducing the poor to try to stack the whole crop until March, they cannot "lie out of their money," as I term it. But ready money is as valuable in March, if not more so, as at any time, and half their crop of flax would be a valuable resource at that time. The

importance of the food supply derived from the boles would be another advantage; as no rippling is necessary for the latter process, the separation of the seed from the fibre is more easily effected, and the fibre less injured. If tenant-farmers would try the process once, they would be sure to repeat it; and I shall be fully rewarded if the reading of this paper will have the effect of inducing a few of those who hear me to turn their attention to the subject, and to induce those who have the means and the opportunity, to try a practice which has been so lucrative elsewhere, and which we have so long and so foolishly neglected.

FAT STOCK SHOWS.

THE present is what may be called the great gala, or holiday season, for us, and all who are interested in the rearing and feeding of stock. And no more appropriate time of the year could be chosen for the exhibition of fat stock, which are annually held not only in the great emporia of meat consumpt, but also in almost every county town commercially interested in agriculture, and even in many small towns. As the Christmas holidays approach, throughout the land has been arising visions of savoury joints, of the roast of beef—be it Devon or Scot, Cornish or Hereford; and the best basted or saddles of mutton, cut from South-Down, Lincoln, or Leicester, or from the best crosses of sheep, which have now become so famous. Then the farmers' work for the year (except this enjoyable and exciting one of competing against each other with beeves and with sheep; with pigs with poultry, which ought not to be excluded out of any catalogue at this festive season) is, we may say, about over. They have nothing to trouble their minds with, save the carting out of manure, and the ending about the steading, which

operations can safely be trusted to the foreman. Therefore they hail with pleasure the advent of frosty weather. Those who do not "go in" for feeding, find relaxation for their year's toil, in Scotland at least, in what they call a "bonspiel"—that is, a game at curling, or what is known in the north as the "roaring game." And a very pleasant one it is; and highly agreeable to the ear, when the ice is hard and keen, to hear the sonorous music of the stones as they spin from "tee to tee"—that is, from one goal to the other. And again, in patronising this game, agriculturists may be said to be patronising their own trade, or profession, or occupation, or science, whatever term it may be preferred to be designated by. We have seen it described by all. For whenever the game is ended, there is one dish ever ready upon the table of the nearest hostelry, to satisfy the craving appetites of those who, standing out in the cold, have yet been kept from feeling any cold by the excitement and the exercise which the game of curling invariably entails—however low the thermometer may stand—that is, *beef and greens*. The delight in curling, therefore, always involves the consumption of the principal products which farmers

grow. And, therefore, for those who have no fancy to fling the "channel stanes," the game is one highly to be commended by farmers, as it is the means of bringing grist to the mill of the butcher who buys their fatted cattle.

But when we said that this late portion of the year—past the time

"When chill November's surly blasts
Make fields and forests bare"—

was a most desirable one for holding fat stock shows, we had other and more important notions in our head than that it was notable for gustatory enjoyments and pleasure on the ice. We were thinking, also, that at no other time of the year could the beasts—to which the feeders have devoted so much attention and practical skill, even science, to bring them to perfection in symmetry and quality of flesh—be disposed of in such numbers at such profits to their owners. In summer, butchers would be chary of buying such large and beautiful animals as those exhibited at shows now, as the meat of those they killed might (through some sudden and untoward change in the weather, say from a clear bracing atmosphere to a warm thick fog) be rendered useless before they could get it disposed of; and the quality of the others they kept alive would be sure to deteriorate on account of their not having the requisite knowledge that the late owners had to keep them going on in a progressive state, which is one of the great secrets of success in feeding. Then, in "the dog-days" people do not care so much for butcher meat; they desire food with less substance and less caloric; and breeders and rearers of cattle have not so much time to spare from the other duties of the farm as is necessarily required to put

on the firm and glossy finish which animals exhibited at cattle shows must possess, in order to have a chance of carrying off prizes. Altogether, as we have stated, there is no more suitable time for all classes of the community for displays of *fat* stock to be held than the present.

The fat stock shows which have taken place are, so far as we have seen and can learn, scarcely up to the standard of some previous years—that is, that there has not been so large a number exhibited; and while many admirable specimens of the agriculturist's art, in bringing beasts to great perfection in symmetry and weight of flesh, at an early age, have been brought forward, there is not among them any one that stands so prominently out above all others, as one or two have done in former years. The scarcity in the entries can readily be accounted for by the prevalence of the foot-and-mouth disease throughout the land, and to the existence of the same malady may, to some extent, be attributed whatever falling off in quality was noticeable, in this wise, that some of the animals themselves may have been attacked at an early part of the year, and consequently suffered deterioration, or that, having escaped themselves, they were pushed forward to fill the places of better cattle that had been victimised by the disease. But with all the drawbacks from *epizootic aptha*, the shows of 1869 will long be remembered as having drawn out very good animals, especially in the sheep classes, and as having furnished agreeable opportunities to all interested, to meet their agricultural friends from different parts of the kingdom, and comparing notes as to the best means of bringing out stock to even greater perfection during the ensuing year.

A FEW MORE WORDS ABOUT CATTLE.

he articles already given, we drew attention to several points of import-connexion with the care of cattle. As points of the subject are by no means exhausted, we purpose to devote a short notice to a few more words about some of them.

It is conceded by many, and those are the first authorities on cattle feeding, that a change of food is a good thing. But the difficulty is in getting the food to change. We have, for so long a period, run so "much in the same groove," as regards the crops we grow for our stock feeding, and that groove is, I say, such a narrow one, that we have no great variety, as an ordinary circumstance to choose from. There can be no doubt that the continental farmers in many respects have a far wider practice than we have in this respect; they cultivate a wide variety of foods, which come into regular succession, so that the animals really have a variety of food in the course of a year. It might be said, in reply to this, that the practice on the Continent is more favourable to the cultivation of this wide variety of food than ours; in many parts it is, but in many it is no better than our own, and in many respects, it is worse—at all events as regards what is done in one place under one set of circumstances, or nearly the same circumstances, it may be done in another. There is, no doubt, a change in our farm cultivation from year to year; crops, and the change is rapidly extending. Still, where so much has been done, more still will be done, and when done there can be no doubt it will be to our advantage. But if the quality of food be good, that change need not be done with judgment. This should not be done suddenly, but the animals gradually accustomed to the changes. It should

be remembered, what is unfortunately often forgotten, that our domesticated animals, although strong, or apparently strong,

are in reality very sensitive creatures; sensitive to changes, and requiring to be dealt with thoughtfully and carefully.

It seems to be a very superfluous thing to say, that food should not only be of good quality, but it should be given in a clean condition, and in clean mangers, racks, and the like; and yet superfluous it is, so far as some are concerned, only in appearance, for the point involved in it is very often, we may say altogether and always overlooked. We have often, indeed, been ashamed in inspecting cattle byres and sheds, to see how disgracefully filthy the mangers, &c., were. One has only to watch the habits of our domestic animals—and it is worth while thus to watch them for the lessons we obtain by the process—to see that they are very delicate in their tastes and likings. Besides, filthily kept places in a man's premises betoken a mind not quite on the right balance.

The last point involves another, or, at least, brings another up to notice: dirt in and about an animal aggravates the effects, if it does not induce the attacks, of parasites, as lice. These parasites have a very prejudicial effect upon the cattle; for so long as they are tormented by them they are kept in an uneasy state, and we all know, or ought to know; that uneasy animals are not thriving ones. We may apply all sorts of nostras for the cure of this, but nothing is, or can be, so effectual, at least in the prevention of it, as cleanliness in everything connected with the animals—cleanliness of the places in which they are housed; cleanliness in the food, in the manger, &c., in which that food is given them; and last, though not least, cleanliness in the bodies of the animals themselves. This can be secured by the regular and diligent use of the curry comb, or the wisp of dry straw, and the regular removal of filth from the stalls in which they lie.

Smithfield Club Prize Animals.

THE OX OF THE YEAR.

ON page 40 will be found a representation of the Earl of Aylesford's short-horn, which carried off the first prize at Birmingham in its class, and which likewise was awarded the chief honour as the best animal in the yard. From Bingley Hall it went to Islington, and there, under the auspices of the Smithfield Club, it gained all the ribbons and rosettes possible for it to obtain in all the monetary premiums and medals, amounting to about £300—more than any one animal ever obtained before. But although it gained so much more than any other show beast, we cannot truly say that it was the best we have seen. It was rather lucky in having this year, through prevalence of foot-and-mouth disease, none better to contend with. Our illustration, drawn by Harrison Weir, is a good likeness, and fully confirms what has been said of it as it appeared at Birmingham, viz. :—"This was a fine square level beast, well filled up round the heart, and the cylinder covered thickly with the best of flesh. It was grand in the flanks and quarters, capital in the twist, with a fine coat of hair. But it was chubby, after the fashion of the Keir bull forth, which gained so many prizes at the Royal and the Highland and Agricultural Societies, and provincial shows of note; but was rather plain in the head and before the eyes, and a little slack in the back, and the legs were added, as the illustration shows, to her patchy coat. The head. But the most noticeable the

largely used. Probably had it been so, it might have shewn to even greater advantage. Linseed cake, bean, barley, and wheat meal, hay, and vegetables, it is stated, were the only commodities supplied to it. Its live weight was 19 cwt. 2 qrs. 23 lb.

SOUTHDOWN EWE.

This sheep, the property of, and bred by, Lord Walsingham, of Merton Hall, Thetford, Norfolk, for beauty of outline, full symmetrical proportions, fine countenance, and general grandeur of appearance, does credit not only to Lord Walsingham as a breeder, but also to the particular breed of which it is a specimen; and when we say *that*, we say a great deal, for the Southdowns have long maintained the foremost place among British breeds of sheep—we might almost add, of the world; and invariably have they attracted the greatest attention at all our agricultural exhibitions. Lord Walsingham's prize Southdown (of which we give an engraving) was only 20 months and 2 weeks old, its live weight being 6 cwt. 3 lb.; and of the nine entries made in this class, with only one exception, this animal was the youngest. We need not here expatiate upon Lord Walsingham's celebrity as a breeder; suffice it to say, that the well earned fame he has already received at the hands of the public, and especially the agricultural portion of it, was fully sustained by his magnificent display at the Smithfield Show. In all the classes of this breed his lordship was particularly successful, coming off with flying colours as first prizeman in the three sections devoted to Southdowns.



PRIZE ANIMALS AT SMITHFIELD—SHORTHORN OX.—DRAWN BY HARRISON WEIR.

ANIMALS AT SMITHFIELD—SOUTHDOWN.—DRAWN BY HARRISON WEIR.



ON SOME POINTS CONNECTED WITH THE SCIENCE OF CATTLE FEEDING.

IN the articles under the above heading, which we have from time to time given, have drawn special attention to the fact—ch, notwithstanding the dictum, or rather a of several authorities on the subject, believe to be a fact—that the various points nected with cattle feeding are not to be ided by chemical data alone—data which, do not hesitate to say, are sometimes ided upon, to say the least, very con-ural opinions—but that, on the con-y, physiological circumstances must be n into account before we can decide, anything like certainty, as to what y constitutes the science of feeding. But, uth, there is not much certainty connected the science. The animals we deal with not like the test tubes of the chemist, which certain substances are put, and results of the combination of which be predicated with accuracy. We have in the living principle to deal with; and difficult it is to predicate, with certainty, result of any experiment, the materials of h are known to us, let those say who v what life is, and how little we really v about it. Hence it is, that in practice find an ever varying condition of cir-stances which bring about an ever varying t in practice, so that what suits one ot suit another; and the food upon which attens, and which is taken with a zest, we has the entirely opposite effect upon er, and, if not rejected with loathing, is, ast, not partaken of with that relish e we know from experience to be an tial element in the proper and healthy ilation of the food. Hence, knowing it has been a practice of late, on the of many eminent feeders, not only to e this important element by changing od of cattle, but to impart to it such a iarity, or such peculiarities, that it in-

duces an appetite and causes the animal to partake of it with a keen relish. And this desire on the part of feeders has been met by those who, always on the look out to “make money”—a perfectly legitimate desire—have introduced special foods. These are pretty numerous; but it is to one class alone that at present we propose to make special reference, namely, what are called (rightly or wrongly, we do not here profess to say) “condimental foods.” By no means desirous to treat the subject of the use of these in a partial or prejudicial manner, and in no way connected with the sale of them, or approving of the way altogether in which they are pushed forward to the notice of farmers, nor of, in some instances, the high price charged for them, we, nevertheless, believe that the whole subject is worthy of that great and calm consideration which should always be brought to the discussion of any question in which important interests are involved. It so happens that we had occasion, some years ago, to take up this subject, and have had such little reason to change our views, that we feel as if we could not do better than reproduce them here:—

In view of the very favourable opinions expressed by unquestionable authorities as to the advantages of this kind of food, it is difficult, consistently, to join with those who denounce them as useless, or that they should be put out of court as unworthy of consideration. If facts, as to the use of food, are placed before us, it is only fair, if it is not philosophical—which, however, we contend it is—to ascertain as fully as we can the nature of the results, if beneficial or otherwise, and how they are brought into action. The converse of this mode of investigation, namely, asserting that there is no value in such results, and no benefit to be derived from the use of the food, is not consistent with the spirit of true science, which is, to investigate all phenomena, how ever contrary they may appear to received theory or preconceived notion. If these phenomena are at variance with science, it does not follow that the phenomena are false; it may follow that science is not

true science, but only pseudo, and, therefore, wrong. This is all that we contend for, that in this question of the condimental food, every attention should be paid towards its scientific investigation. Assertion on one side should not be met with simple assertion on the other. Dogmatism is always doubtful, whether it be the dogmatism of scientific or of practical men. Further, we contend that as much stress should be placed on the physiological as the chemical features of the question, when its discussion or investigation is being carried on. That if the materials of the food are inert which is duly analysed, the organisms which they are designed to nourish are not so; in short, it is worth while, if it is not essential, to remember that in all these investigations we have the elements of the "interference of life" to deal with. "The chemist," says the able author who points out this thing to be remembered, "employs vessels of glass in which he isolates the substances he experiments upon, keeping them free from the interference of other substances, because he knows that without such interference, his experiment will be nullified. . . . But in the vital laboratory no such isolation is possible. The organisms have no glass vessels, no air-tight cylinders. Vital processes go on in vessels, which, so far from isolating the substance introduced, so far from protecting it against interference, do inevitably interfere, and are themselves involved in the very changes undergone by the substances. . . . Besides the complications which occur from the inevitable interference of the organism itself, and from the differences resulting from differences in the state of bodies, there are other complications arising from causes peculiarly vital." Again—"Each individual organism is specifically different from every other. However much it may resemble others, it necessarily in some points differs from them, and the amount of these differences is often considerable. If the same wave of air striking upon the tympanum of two different men will produce sounds to the one which to the other are inappreciable—if the same wave of light will affect the vision of one man as that of red colour, while to the vision of another it is no colour at all—how unreasonable it is to expect that the same substance will bear precisely the same relation to the elementary system of one man as to that of another. Experience tells us that it is not so." All such considerations have a close and important bearing on the food question. As the feeder has to deal with living organisms, involving physiological consideration, it is obvious that physiology cannot be ignored; chemistry alone cannot explain vital processes.

In connexion with this "condimental food discussion," it is necessary to state here that, in the opinion of most men of science who have taken part in the discussion, the effect of the food is medicinal rather than nourishing; they admit that they may be useful in restoring diseased or poor animals to health or condition but that for healthy animals they are neither

necessary nor economical. Mr J. B. Lawes gives this as his distinct opinion. He asserts its true effect, that its use increases the appetite and the consumption of food; but that increase of weight is not in proportion to the increase of the consumption. It is, therefore, if this would prove true in all cases, quite evident that there may be such a thing in condimental food as "buying gold too dear." "A larger quantity of food," says Mr Lawes, "is required to give the same increase of flesh when Thorley's food is added, and this is the result which science would predict. There is nothing in science to predicate that an article which has great tonic and stimulating properties is likely to increase the assimilation of food. You may make a large quantity of food pass through the stomach of an animal, but you cannot make him assimilate these foods. If, therefore, you regard these things as food for animals which are in good health, they are not to be recommended at all. Call them medicines if you like. I have no doubt they have considerable medicinal properties, and do enable animals to digest their food, where otherwise they would not do so." (The question may here be put parenthetically—if this aid to digestion is gained by the use of these condimental foods, is not a point of some importance gained? What is digestion? is also another question which may be here asked. The answer, when attempted, will be suggestive of much that has a close bearing on the subject.)

Professor Simonds is clearly of opinion that no benefit is derivable from the use of condimental foods,—that even as "medicinal agents they are very bad, indeed, as medicinal compounds." But, at the same time, he believed that "many of them had the effect of invigorating the system; and if the powers of digestion of the animal were weak, of enabling it to digest a given amount of food in a less space of time, and, consequently, to appropriate by assimilation a larger portion of food than otherwise would be assimilated." But this, the Professor is of opinion, could be obtained in a much similar and cheaper manner than by buying the "condimental foods at the proportionately high prices at which they are sold. For instance, the agriculturist might make an excellent condimental food as follows:—Well-ground linseed meal, mixed with bean meal, salt, cummin seed, caraway seed, ginger, gentian, or any of those materials which would act simply as stomachics."

In looking at this opinion of Professor Simonds, it is somewhat difficult, we opine, to reconcile the opinion which he expresses as to the non-value of mere feeding condiments with his belief that they enable the animal to "appropriate, by assimilation, a larger portion of food than otherwise would be assimilated." What do we generally mean by the assimilation of food? Does it not convey to us the idea that the food in this case does its duty? that the assimilation of the food is the end we aim at? When we speak of plants having assimilated the fertilising materials in the soil, or in the manure we give to it,

do we not mean to infer that the end arrived at has been gained? If, then, condimental foods aid the assimilation of the other kinds of food with which they are mixed, are they not valuable? We put the question in the interests of science, not in those of cattle-food makers, for none of whom we care a jot. Assimilation, we presume, conveys something definite and decided; if so, what does it mean? What does Professor Simonds convey, or wish to convey, by its use? Further, in the interests of science we contend that in the discussion of the condimental food question, price—as price—has nothing to do with the feeding capabilities of the food. In discussing anything, it is worth while to know what it is we really are discussing. We may discuss, for example, the best mode of getting in our barley crop, but that is clearly different to discussing the value of it when it is got in. So in this question of condimental foods, the discussion of the one point, do they really possess *feeding* value, is essentially different from that which has reference to their pecuniary value. Decide the first point, and then discuss whether such value which they may be shewn to possess is not paid too dearly for at the price the manufacturers demand for them. The gold, we admit, may be bought too dear, which we laboriously extract

from the quartz, but it does not follow that the quartz contains *no* gold. Let our chemists and physiologists decide whether or not there is a value in such foods—that is, a chemical or physiological value—and then we are prepared to discuss what this value is worth. That the opponents of our condimental foods believe that they have some value, is apparent enough; if not, why give farmers receipts for making them? If they are not worth as food, why make them at all? In concluding our remarks on this most interesting subject, we again say we are not advocating the use of condimental foods; but what we contend for is, that the whole subject should be discussed in a much broader, more catholic and scientific way than we venture to say it has yet been favoured with.

It is several years since the above remarks were penned; and it is, to say the least, suggestive of how slow progress is in some departments of practical science, to note that the discussion here desired has not yet taken place. How long it will be before it does take place we cannot say; not, certainly, till a thorough investigation of the whole subject be entered upon in a truly scientific way, an investigation, so far as public signs are concerned, which we regret to see has not yet been made.

CONTINENTAL FARMING.*

BY JAMES HOWARD, M.P.

A FEW days ago, as I was reading Dr Norman Macleod's account of his recent journey, entitled "*Peeps at the far East*," the thought occurred to me that the title of the paper I am about to bring before the Club should have been "*Peeps at Continental Farming*;" for, within the space usually devoted to any question discussed in this room, it would be impossible to traverse the whole field embraced by my subject. I believe we have arrived in this country at a position when, as a nation, we are proud of our agriculture, proud of the rapid progress made in the cultivation of the soil, proud of the perfection to which our live stock has been brought—proud, may I say, of our mechanical achievements in farm operations—proud, as the chairman has remarked, of having been able to compete with the whole world; further, we are proud that other departments of industry and other nations have come to recognise the scientific status British agriculture has attained. I confess that I share in this pride; actuated by this feeling, and believing that, in the art of farming, England is in advance of every other nation, the conclusion is naturally arrived

at, that we have little to learn from other countries. Like thousands of other Englishmen, for years I travelled backward and forward to France, impressed with the notion that the only lesson we could learn from the farmers across the Channel, was the one to be learned from some of our enthusiastic amateur friends at home, viz., *practices to be avoided*. During the first International Exhibition at Paris, in 1855, I had occasion to visit some large and well-managed French farms; my insular prejudices from that time became abated; from time to time since that period, particularly during the International Exhibition of 1867, other farms, both large and small, in different parts of France have come under my observation. On my return to England, after the close of the Paris Exhibition, I addressed the following letter to the President of the Royal Agricultural Society:—

"My Lord Duke,—I desire to draw the attention of the Council to the important question of growing sugar-beet in England. During the Paris Exhibition, I made several excursions into the country with a view to see some of the most celebrated farms; at each I found a large portion of the land devoted to the growth

* An Address delivered before the Central Farmers' Club.

of this root. Upon inquiry I learned that the profit on the crop was far greater than upon any crop grown in England. I have been assured by agriculturists from various parts of Europe, who have visited me, that they see nothing in our soil or climate to prevent the growing of sugar-beet in excellent quality. As it is a question of national importance, I venture to suggest that the Council should send a small deputation to the Continent to obtain reliable information upon the subject, and upon the best mode of making sugar from the beet. M. Decrombecque, of Lens, in the north; M. Dailly, of Trappes, near Versailles; Baron Rothschild, of Ferrières, near Paris; M. Cail, at La Briche, near Tours, have very complete sugar factories and fine large farms; the last named has nearly 4000 acres. I believe a well-selected deputation to visit the best farms on the Continent would bring home a vast deal of information on many subjects beyond the particular one in question, and which would prove advantageous to British agriculture.

"To His Grace the Duke of Richmond."

In reply, I received the usual official acknowledgment from the secretary, Mr Hall Dare; but as no mention was made of the subject in the succinct report which usually appears after each monthly meeting of the Council, I am to this day in ignorance whether the subject ever came before the members or not. When I wrote to the President, I was not aware of the intention of Mr Duncan to establish a beet-sugar factory at Lavenham, in Suffolk. Believing that some account of Continental agriculture would be interesting, if not advantageous to the English farmer, I determined, at the time I have named, to bring the subject before this Club. Last year I was prevented from carrying out my intention by an attack of illness and other circumstances; instead of taking a holiday at the sea-side this autumn, I determined upon a tour on the Continent; the object I had in view was to note down facts upon any topic that might come under my observation, and more particularly to acquire information upon the subject alluded to in my letter to the President of the Royal Agricultural Society of England. Wherever I went on my tour I was received with cordial welcome; information was readily given, and what was very gratifying, England was always referred to with the greatest respect and the most kindly feelings. If tourists on the Continent, who know anything of farming, would strike off into the rural districts, and give up the usual sight-seeing of cathedrals, museums, antiquaries, and other similar objects, they would find travelling far less monotonous, and return home not only with more information, but with many more pleasant reminiscences of their trip. I have obtained a good deal of information from persons in various parts of Europe upon the condition of agriculture in their localities. I purpose giving some of the principal and other facts in an appendix to my

paper, as I think the information is worthy of being placed on record for those who may feel an interest in the inquiry.

FRENCH FARMING.

I would first invite attention to the Agriculture of France. French agriculture has long had, what many have advocated for England, viz., a Government Department of Agriculture, presided over by a Minister, who takes under his paternal wing the whole family of French agriculturists. The collection of statistics, agricultural colleges, veterinary colleges, experimental farms, mechanical museums, schools, roads, drainage, horse-breeding, chemistry, the necessary supply of food for the people, an experimental implement factory, and a hundred other things, are under his control, and the expenses of these various institutions are defrayed by the State. Again, the State establishes horse shows and agricultural meetings. The whole country has been divided into twelve districts, in each of which a show, termed a *Concours Régional*, is held, and large sums are distributed with a view to stimulate improvement in the various departments of farming. At these shows everything is under the control of an Inspector-General of Agriculture, the whole expense being borne by the State. Further, the French Government, with a view to raise the general standard of farming, offers, in each of the districts, £200, and a silver cup worth another £120, called the "Premium of Honour," as a prize for the best managed farm on which the most useful improvements have been introduced. With all these various agencies in full force, one might expect that agriculture throughout France would be stripped of everything primitive, and that the motto of the new French Agricultural Society, "Practice with Science, Progress with Prudence," would be everywhere realised.

If an intelligent English agriculturist were to form his estimate of French farming by what he could see from the railway between Calais and Paris, he would, from the small number of animals and other indications, come to the conclusion, that the whole country was going to the bad. This, however, is not the case. Improvement is very slow, scarcely perceptible, except to those who make an inspection at long intervals. In England, it was many years before such farms as the Earl of Leicester's in Norfolk, the Duke of Bedford's at Woburn, and Earl Spencer's in Northamptonshire, exerted any marked influence in farms throughout this country. So in France, there are scattered up and down farms which are as far in advance of the general agriculture of the country as were the farms of the spirited noblemen I have referred to at the beginning of the present century. The farms I have alluded to have many of them received the "premium of honour," and are exerting a quiet, but powerful, influence in their respective neighbourhoods.

Notably among such farms is that of M. Decrombecque, at Lens, about 50 miles from Calais. M. Decrombecque is a very remarkable man; although upwards of seventy years of age he is full of energy.

is well read in agriculture, and knows England; he is familiar, too, with English methods of farming, of which he has not been slow to avail himself. His farm is 1200 acres in extent. Half the land is his own, purchased out of profits made by farming, and I ought, perhaps, to add, by supplemented sugar making; indeed, he told me he had very little capital when he commenced forty-six years ago. On the occasion of my visit, in the harvest of 1867, his wheat crop was very fine. I saw also 500 acres of beetroot, all on the ridge, without a single blank spot in any part. He estimated that the produce would weigh about 18 tons per acre. The land had been all ploughed 16 to 18 inches deep, with huge ploughs drawn by ox teams, sixteen in a team. On all the large farms I visited, I found two sets of ploughs, one set for ordinary ploughing, and the other for deep work, called "*charrue profonde*." Thirty horses and eighty working oxen were kept, the latter only working half time. M. Decrombecque has had a sugar factory on his farm for many years; he thinks that farming without this adjunct must be a very slow affair. 300 to 400 cattle per year are fatted on pulp from the sugar factory. He has adopted the "box" system, which he came over to England to see nearly twenty years ago. He finds great advantage, and I call particular attention to the fact, in keeping the cattle in darkness the animals are not so troubled with flies, they eat better, and he has found that they are much sooner ready for the butcher than when kept in daylight. An operation I saw going on, I thought worth making a note of. As soon as, and sometimes before, the wheat was carted, heavy flexible or spiked chain harrows were run over the surface with a view to set the annual weeds and shed corn germinating. The operation is expeditious, and not very costly; and M. Decrombecque, after many years' experience, finds he is amply repaid for the trouble. He prefers it to any system of paring or shallow ploughing.

Another highly cultivated farm is that of M. Gustave Hamoir, at Saultain, near Valenciennes, about 200 miles north of Paris. This gentleman is a very superior and intelligent man—quite my notion of what a farmer ought to be—observant, shrewd, well informed, and in manners the gentleman. In M. Hamoir's district, the country is covered with sugar factories, and the properties are much subdivided—25 acres in one plot being considered quite a large field. One-third and even one-half the land is cropped with beetroot. There are a few farms of 400 to 600 acres, but the general run is about 30 to 40 acres. For five years, M. Hamoir has had fully half of his farm cropped with beet, all the rest wheat, except small portions for growing fodder, clover, and lucerne. Guano is becoming less esteemed, as it does not produce so good sugar-beet as oilcake, which now is applied to the land as manure. M. Hamoir, like M. Decrombecque, ploughs his land some 16 inches deep for the root crop. The rent in this district is higher than in any other I know—the average is said

to be 72s. per acre, and in large plots, it sells for as high a price as £100 per acre. The price of land is enhanced from the fact that the French farmer does not and will not appreciate any other investment than land, and will therefore buy at almost any price when the opportunity offers. M. Hamoir says he has known land sell as high as £192 per acre. His opinion is, that it would be better for all interests that the small farmer should not be a proprietor or landowner, especially at the price he has to pay. The interest of his money invested in ordinary securities would enable him to hire, even at a high rate, double the quantity of land he can hold as an owner; but this course is not adopted because of the ignorance which prevails, and the fear of investing money in other ways. Another reason, says M. Hamoir, and at least as powerful a one, is that of the short duration of leases, which are for nine years. The tenant stands in fear and dread that, at the end of his lease, he may be ousted for some other competitor.

I will now give you a picture of a very different district, that of Sologne, about 150 miles south of Paris, in which M. Edouard Leconteux, editor of the *Journal d'Agriculture Pratique*, has a farm, and to the improvement of which poor region he has devoted himself. In this part of the country there are large estates, some being 5000 acres in extent, let off, however, in farms varying from 500 acres down to 2 acres. The rent of the large farms is from 5s. to 8s. an acre, and the freehold value as low as £3, 10s. to £8 per acre, and much of it is held upon the "*métayer*" system. M. Leconteux states, in his graphic style, "that the peasantry and small farmers are possessed by the *demon* of property in land;" they buy land and have no capital to work it with. Not much wheat is grown in this district, and the yield is as low as 15 to 18 bushels per acre. In well cultivated fields the yield may reach 24 to 30 bushels per acre. Rye is the principal crop grown, the produce being 18 to 24 bushels per acre. The wages are 1s. 8d. per day in summer, and 1s. 3d. in winter; no extras in harvest, but some piece-work. Low as these wages are, they are said to have doubled within a few years.

In my letter to the Duke of Richmond, I referred to the large farm of M. Cail, which is situated at La Briche, near Tours, 200 miles south-west of Paris. M. Cail is proprietor of one of the largest engineering establishments in France, a great builder of locomotives. In the early part of August 1867, I accompanied him to his farm of La Briche. It consists of about 3800 acres, which he has reclaimed from waste land—bog and wood. Being a thorough utilitarian, not a tree or a fence of any kind has been left; the whole is laid out in large fields, some nearly a mile across, which have been drained, and good hard roads made through the whole property. One good central homestead and eight minor ones have been erected. It requires but a glance to be convinced that the proprietor of such a place is a man with an iron will. The central homestead, the most wonderful place of

the kind I have ever seen, is worth making the journey to see. The corn barn, with a triple roof, like a railway station, is 366 feet long and 130 feet wide, and 32 feet high in the walls. It will contain 1250 acres of unthreshed corn. A line of shafting and pulleys run down the centre throughout the length. The threshing machine, a portable one, is drawn forward as the threshing is accomplished. Everything is on the same scale—sheds for 600 bullocks, a covered fold for 3000 sheep, a huge granary for threshed grain, tramways to every part, a large beetroot distillery, at which the roots are made into sugar or spirit according to the prospect of the market. Every vehicle on entering and leaving the homestead passes over a weigh-bridge at the gates, and the weight of the load is recorded and charged to or credited to the respective fields. The farm is cultivated on the three course shift; first, wheat; second, beetroot; third, clover. I rode over 1250 acres of fine beetroot, beautifully cultivated. Little attention is given to the hoeing of corn by sugar-beet growers, as the land is supposed to be thoroughly cleaned when under the root crop.

Boys sent to reformatories in France are employed in agriculture till their turn comes for the conscription. The reformatories are called agricultural colonies, and are distributed over the rural districts. I found at La Briche 130 of these boys, from fourteen to eighteen years old; they work in gangs, under a superintendent sent with them from Mettray Reformatory. During the winter evenings they are taught reading, writing, arithmetic, and measuring.

The condition of the labourer in this part of France, as in most others, is a very hard one. At each of the eight homesteads I have referred to, is a married couple, who supply food to the labourers employed in their division, the greater part of whom are unmarried. The team-men sleep with the cattle, two in a bed, or rather in a box, on a sack of straw, a rude floor being put up at one end of the sheds. Up to that period, I had never seen men so nearly reduced to a state of slavery. I arrived at the farm about daylight, and found all the hands at work. The hours in summer, I learned, were from 4 A.M. to 8 P.M.; and, mark you, till noon on Sundays. The wages, without any perquisites for these long hours, are 1s. 8d. per day. A good crop of wheat was being cut, the men using fagging-hooks; 5s. was the price paid for cutting and binding an imperial acre; and the wages paid by M. Cail are higher than the current wages of the neighbourhood. In spite of the rigid condition in which the labourers at La Briche work, I noticed a deal of apparent good feeling, as well as an approach to familiarity between employer and employed. The men addressed M. Cail with a kindly salutation, whilst, to my astonishment, and intense amusement, this gentleman of polished exterior, living in great style at one of the most elegant houses in Paris, saluting the various foremen by kissing them on both cheeks, receiving a corresponding salute in return. I managed to keep my risible

faculties under restraint, until arriving at the blacksmith's shop, when a similar scene between M. Cail and the foreman, a grimy son of Vulcan, proved irresistible. M. Cail is a shrewd man of the world, and, noticing my amusement, remarked that, conforming in this way to the custom of the province had given him a hold upon the people he could not have obtained had he totally disregarded their notions of "equality and fraternity." At the time of my visit, I thought the condition of the farm labourer of La Briche might be exceptional, but I find, upon inquiry, that it is not at all an unfavourable specimen of the condition of the French peasantry, and that a franc per day has not been an unusual scale of pay. This condition of things is now beginning to bear the fruit it might be expected ground down in this manner, the peasantry have been flying to the cities. About a month ago, an article on the subject appeared in a newspaper, published at Vendôme, 450 miles south of Paris. It commenced by saying, "that the fact of the depopulation of the agricultural districts, is the gravest thing we have to register at present. It is nothing less than life or death for the whole country." Agriculture in France, says the writer, has till lately followed its traditional course, and allowed all other industrial pursuits to outstrip it. Wages have been kept down, and with a view to this object, marrying has been discouraged by proprietors and farmers. Families have become proverbially small, even among the labouring population; then there has been the conscription—an army of 700,000 to 800,000 men is no slight drain upon the rural population of a nation. It is not difficult to perceive how the present condition of things may lead to a solution of the European question, by rendering a large standing army in France an impossibility. Things have reached such a pitch in the district of Vendôme, that the owners of some of the richest land in France, the Count de Gouvello, and others, unable to find tenants, have been compelled to resort to the co-operative system for the working of the farms.

LIVE STOCK OF FRANCE.

With respect to the live stock of France, there is little to remark upon either the breed of cattle or sheep, or the method of feeding. The Swiss race of cows are in high repute for their milk qualities. The Charollais are handsome, but, like nearly all the native breeds, they are being crossed by the English short-horn or Devon. At the fat cattle show of Poissy, and at other exhibitions, I have seen beautiful specimens of cattle thus bred. Except the merinos, the native breeds of sheep possess precisely the qualities which an English breeder would shun. Downs, Leicesters, and Oxfordshires are, however, obliterating the native defects, and I may say the same of pigs. Yorkshire, Berkshire, and Essex, have changed the "unclean" appearance, which the pigs had when I first went to France. There is, unmistakeably, throughout France, a marked improvement in the live stock of the farm. M. de la Trehonnais has greatly contributed

ance ; he has been the means of introducing many hundreds of our best bred sheep, and pigs. I believe the efforts of the Government, whatever may have been the fostering care in other departments, unquestionably had a marked and salutary effect in the breeding of horses, and it is not improbable that in a few years we may have to resort to France for a supply of the best riding and carriage horses. Horse-establishments, termed *Haras*, have been maintained by the State for many years. For a trifling sum a farmer can, at these establishments, obtain the use of the best stallions. Stallions are also sent from the *Haras* to various districts of the country, and, from another view to encourage the breed of good horses, the Government grants a handsome premium to the owner of a good stallion approved by the Government inspector ; without a certificate from the Government, a horse is of little value for stock purposes. The improvement in riding and carriage horses, and the breed of draught-horses is greatly changed. The Percheron, in particular, has been brought to perfection. They are not big, but are active and powerful, and for our hilly districts would prove, I think, a valuable breed. The French give the credit for knowing horse-flesh, but mainly are careless about our horses' feet. Certainly, as I have shown, the condition of the horse is as well as the shoeing, have shewn considerable improvement.

To any one who desires to see a stable of Percheron horses well managed, I would recommend a visit to the Northern Railway stables in the *Château de la Motte*.

SMALL FARMS OF FRANCE.

As I have hitherto called your attention to the large farms ; there really is little practical information to be gained from the small ones ; but I cannot pass over without a few remarks. Throughout the whole of France small farms preponderate. There are thousands of 1, 2, and 3 acre farms, held by small farmers who fill up their time by working for the large farmers. The size of farm considered necessary for a family is about 4 hectares (10 acres). A few cows are generally kept on such holdings ; they supply the family with milk and butter. They are not taken to the plough, and draw the cart to market. An uncommon sight is a bullock and a pony together pulling the plough, or a horse and an ass. I remember seeing a horse, a bull, and an ass drawn together. These farmers work from sunrise to sunset, doing double the work for themselves they would do for an employer ; and they live far harder than the large farmers. These small farms grow little besides wheat, oats, clover, and potatoes ; occasionally a few turnips or beet is to be seen. Thirty bushels of wheat is considered an excellent crop. Leaving out of consideration the vine districts, rows of apple, pear, and cherry are often to be seen skirting the little farm. There is a very material difference between the habits of the French peasantry and the English agricultural labourer.

The French are sober, live very hard, scrape together every penny they can lay hands upon, with a view to becoming one of the hard-working, hard-living farmers I have described. In drawing my observations upon France to a close, I would remark that the French farmers unquestionably enjoy, both in soil and climate, great advantages over the English. It may be, that for centuries France relied too much upon her natural advantages, and thus reduced the fertility of her soil below the standard of England. Many attribute the smaller productiveness of France to the pernicious effect of the "Code Napoleon," in the distribution of the land—that the subdivision of the land to the extent it has been carried in most parts, offers an effectual barrier to agricultural improvement, I think few practical men will doubt. But I will not, just now, pursue this question further, but will resume it before I finish. Just one word on the Government Department of Agriculture. A considerable number of influential landowners and agriculturists of France have come to regard the Government patronage of agriculture as an incubus, and some time since commenced the organization of a National Agricultural Society, somewhat after the model of the English one ; but it is said that Imperialism has frowned at this attempt at independent action ; at all events, I learn that the scheme is placed for the present under the ban.

BEETROOT CULTURE—SUGAR AND SPIRIT.

Before proceeding to describe the agriculture of other countries, I propose to discuss the question of beetroot sugar. The growth of beet for the manufacture of sugar and spirit forms the most important branch of farming in France, Belgium, and Germany. It has proved to be such a source of national wealth to those countries, that it naturally takes precedence of all other agricultural topics. For the past ten years, the growers and makers have supported a newspaper (*Journal des Fabricants de Sucre*) devoted to beetroot culture and sugar-making. I mention this as an indication of the importance of the trade. That sugar could be extracted from beetroot was known as early as 1747. The discovery was made by Margraf, a chemist of Berlin ; but his discovery excited but little attention. About the close of the last century, another Berlin chemist, Achard, gave to the world an account of the process carried on at his beetroot sugar factory in Silesia, by which he extracted some 4 per cent. of sugar. The scientific men of the Continent from that time were aroused to the importance of the subject. The attention of Napoleon having been directed to it, he determined upon introducing the manufacture on an extensive scale, his view being the breaking up of the Colonial prosperity of Great Britain, by excluding from France and the Continent the important Colonial produce of sugar. The first factory was established about 1809, since which time it has made steady and, considering the difficulties, fiscal and otherwise, rapid progress. In less than thirty years from its introduction, no less than 50,000 tons of sugar were made in

beet; and, according to the last return, there are now in France 470 beetroot sugar factories; in Belgium, 116; and in Prussia, 255. In the Zollverein, 2,500,000 tons of beet are annually converted into sugar. In Austria, Hungary, Russia, and other parts of Europe, the process is also successfully carried on. To France, that which was commenced as a military expedient has proved to be not only an important department of national industry, but the most powerful stimulant to French agriculture.

The late Mr Frere wrote six years ago as follows:—"When we see what a mighty agent the introduction of beetroot, as an industrial crop, has proved for the regeneration of agriculture in the north of France, we may see reason to note and ponder such statistics in our minds, even if at present we cannot advantageously turn them to practical account." To shew the appreciation in which this branch of industry is held in France, at an agricultural meeting held a few years ago at Valenciennes, a triumphal arch was erected, on which appeared the following inscription:—"The growth of wheat in this district before the production of beetroot sugar was only 122,000 qrs., the number of oxen 700; since the introduction of this sugar manufacture, the growth of wheat has been 146,000 qrs., and the number of oxen 11,500." Since I have looked into this subject, I am surprised that it did not sooner occupy the serious attention of English agriculturists. Perhaps the indifference arose from the failure of early attempts made at Chelsea, Wandsworth, Minely, Belfast, and other places, as well as from a settled belief that our climate was not adapted for the growth of the particular kind of beet required for the manufacture. That the climate and soil of the drier parts of England are well suited to the growth of the root is clearly set at rest, not only by the analytical tests made by Professor Voelcker upon roots grown in England, in Belgium, and in France, but by the practical results obtained by Mr Duncan, at the sugar factory in Suffolk. The per-centage of sugar in beet is, upon an average, estimated on the Continent at about 10 or 11 per cent., whilst the roots analysed by Professor Voelcker, grown at Barking, with London sewage only as a manure, contained 13 per cent., equal to the very best Silesian. That the sugar-beet requires for its perfection a better climate than ours will, I believe, be proved by further experience to be a fallacy. The temperature of the north of France and Germany is far more suitable to its growth than that of the southern parts of those countries. What I learned to be of most importance is, that the months of August, September, and the early part of October, should be warm and sunny; for it is in the latter ages that the sugar is formed. To ensure the best results, great care is necessary with the manuring and proper tillage of the soil, the choice of seed, the subsequent cultivation, and the harvesting. At Cologne, I

ed a large concern belonging to the Rhenish Beet-Company, a firm composed of three part-

ners. In addition to the roots grown on their own extensive farm of 7200 imperial acres, which I shall notice presently, large quantities are bought of the surrounding farmers, at 20s. per ton, the pulp being given back free. The firm has issued printed instructions for the guidance of the farmers of the neighbourhood.

"1. In order to grow good sugar-beet it is necessary that the land intended for the roots should be ploughed at least 10 inches deep before the winter; as the frosts render the soil as fine as ashes, it enables the farmer to work the land readily in spring, and the rapid growth of the plant is greatly facilitated. 2. From experience it is proved that roots planted in ground freshly manured, either with farm-yard dung or compost, suffer from unequal growth and various kinds of insects. The quality also, in most cases, is inferior. It is better, therefore, to highly manure the previous crops and avoid the direct application of manure to the beet-field. 3. As soon in the month of April as the land has become sufficiently warm (say 45 to 50 deg. Fahrenheit) the sowing of the seed should commence, for, according to all experience, the earliest planted beet are always the best. Drilling in all cases is to be preferred to sowing by hand. The cultivator should always bear in mind that the soil should be as fine as meal, yet not too loose, so that the seed is not deposited too deep. 4. If sown by hand, the roots should be in 14-inch squares; within the radius of the Cologne fortification, a rich district; the rows should be 12 inches wide, and the roots 8 inches apart, so that they do not become too big. If drilled with a machine, the distance should not exceed 15 inches, and thinned out at 10 inches. 5. As soon as the plants are visible, hoeing between the rows should commence. The growth of the weeds is thereby checked, and also, the ever-forming crust, which shuts out the air, is broken, and insects and vermin are destroyed. When the plants have six leaves, the thinning or singling out should be begun. Frequent hoeing subsequently is also necessary to keep the land from becoming bound. When, in the month of July, the heads of the roots shew above ground, which heads are totally useless for the sugar manufacture, their development must be checked by moulting-up, which operation also facilitates the getting up of the roots when ripe. 6. Leaves are to a plant what lungs are to an animal; therefore, nothing damages the beetroot more than taking off the leaves before harvest. Such a senseless course reduces the value of the crop one-half. 7. Roots, which are to be kept for several weeks, or perhaps months, before being taken to the factory, should be quite ripe when gathered, should not have been exposed to frost, and should have been harvested in a fresh or moist condition. The roots are seldom ripe before the middle of October yet frequent frosts occur at the beginning of November; the beetroot cultivator must, therefore, make haste to harvest his crop before the frost commences, and postpone all other work until the crop is secured. If a long drought has occurred, the growers should wait

good rain has fallen, for roots which are dried in dry weather, and after a long drought, will rot. 8. The raising of the roots is best performed with the use of spades or shovels; forks are not suitable for the operation, for, from experiment, too many roots are forked, and pricks are a certain cause of decay, and a smooth cut with a shovel is not so injurious. In the case, however, wounding of the roots must be carefully guarded against. 9. The leaves of the roots should be cut off with a sharp knife close to the crown, also the under leaves, which in most cases decayed, must be removed by the hand or knife, because they induce rotteness, and if left on the roots are troublesome during the washing process. The roots which are to be conveyed to the factory should be covered three or four days of gathering should be fully covered with leaves, because the sun's rays cause decay of the roots, and rotten roots produce moulded juices, which are valueless. If the roots have to be taken to the factory later, they must be thoroughly well covered with earth, in deep pits or heaps, so as to protect them from the heat of the sun as from the frost, and prevent their losing quality or quantity. The cultivator should remember the well-known proverb, 'Out of the earth, into the earth'—*i.e.*, the earth not only produces but preserves. 11. The pits should be 3 feet wide, and one spit deep, of any convenient length. The roots should be laid on the heads outwards. The work of covering the roots as the removal to the factory should be carefully performed, so as to avoid the bruising or rotting of the roots, as their soundness is of the greatest consequence. Heaps which are 3 feet wide should not be more than 3 feet high, so as to keep the roots cool and prevent their sprouting. The roots should be covered up *immediately*, with at least 2 feet of earth in order to avoid thoroughly the admission of every change of temperature is injurious to the roots. Ventilation by straw chimneys or other means must be most strictly avoided. If the heaps are not completed before night, a thick layer of straw could be used as a temporary covering to pre-vent the roots by night frosts. 12. In carting the roots to the factory, great care must be taken against bruising or breaking off the tap-root (the tap-root is the best in sugar), for roots handled roughly soon rot in spots and quickly rot. 13. That the fore-lesons are attended to properly, the inspector ap-propriate to the sugar factory will satisfy himself from time by actual observation." Do not mistake, these rules contain matter for the farmer, and may suggest to the thoughtful English farmer some useful lessons in the cultivating and har-vesting of the ordinary mangold crop. The processes in the sugar factories of the Continent are very different. The roots, being first washed in a machine, and pulped, the juice pressed out by hydraulic press, followed by the usual refining process. At the manufactory I have referred to at Cologne,

at which 150 tons of beetroot are converted into sugar daily, the process of extracting the sugar is unique, and far more perfect than at any other factory I had the opportunity of inspecting. Indeed, the whole arrange-ments are most complete. Every department was thrown open to me, and every process explained, with- out the least reserve. When the inspection of the factory was finished, a carriage and pair, belonging to one of the partners, was politely placed at my disposal for a drive round their extensive farm. To return, however, to the sugar-making: Instead of extracting the juice from the pulp by pressure, as is the general practice, the pulp is put into a kind of colander, placed inside a cylindrical vessel; when filled, the colanders are put in action by the steam-engine, and a rapid rotatory motion is imparted to them. The juice is thereby thrown off by centrifugal force. The result of this plan was said to be that 2 or 3 per cent. more sugar was obtained than could be extracted by the process of pressing. In Prussia, the manufacturer has to pay the Government duty of 14s. 6d. per ton on the roots, instead of 17s. 8d. per cwt. on the sugar, as in France. The Prussian maker has, therefore, a greater inducement to extract every particle of sugar. This arrangement, again, has led the German cultivator to be much more particular in the choice of his seed. The best description I met with is the "Improved Vilmorin," propagated by M. Louis Vilmorin, of Paris, who claims to have had re- course to the process of selection and the establish- ment of pedigree in plants long before Mr Hallett was heard of. M. Vilmorin informs me that the Vilmorin beet is more highly prized in Germany than in France, and accounts for it by the fact of the duties being levied in the different manner I have described. The refuse of the beetroot after the sugar has been ex- tracted forms an important article of cattle food, and is held in high estimation. About 18 to 20 per cent. is the proportion of pulp left; the worse the quality of roots, the smaller the quantity of pulp. It is preserved in deep pits, generally bricked like a grave—very often the expense of bricking is avoided—a covering of earth is laid upon the top. The pulp is generally consumed within the year; but if well covered up it can be kept sweet and good for two years, or, as I was assured, even for three years.

Much controversy has taken place both as to the relative value of pulp as feeding stuff and as to its real money worth. Many practical men maintain that a ton of pulp is equal in value to a ton of roots. I think the money worth is best settled by the price it fetches. The average price at the factories I visited will amount to about 13s. per ton. Although horses do not like it, bullocks, which cannot be fattened on the root alone, can and are sometimes fattened for the English and foreign markets, without any other food than the pulp. Pigs do well upon it when cooked. Sheep will eat about 12 lb. a-day of raw pulp. It is unquestionably more easily digested than the root itself; but cows kept upon it are said not to pro-

much milk. I was fortunate enough to obtain a debtor and creditor account of a sugar factory upon the Continent, the locality of which, for obvious reasons, I am not at liberty to indicate. The proprietor is a large farmer. In it between 13,000 and 14,000 tons of roots per annum are made into sugar. The total expenditure, exclusive of the interest upon the money embarked, was £19,500, the total receipts about £33,000, leaving, as will be seen from the subjoined statement, over £13,000 for profit and interest of money :—

SUMMARY OF EXPENSES AND RECEIPTS OF A BEET-ROOT SUGAR FACTORY DURING ONE YEAR.

Outgoing Expenses.

14,000 tons of beetroot at factory, including cartage, maintenance of carts, seed, at 19s. per ton		£13,300
2600 tons of coal, at 12s. 6d. per ton		1,625
130 tons of coke, at 24s. per ton		160
350 tons of lime, at 8s. per ton		140
12½ tons granulated charcoal } 2½ tons powdered charcoal }	at £11 per ton	165
1200 sacks		250
1500 filtering bags for hydraulic presses		50
1600 pulp bags		100
Cloth and canvass		25
Baskets		20
Workmen's wages		2,060
Salaries of manager and foremen employed all the year round		600
Expenses of carriage outwards, and in connexion with sales		450
Gas		80
Grease and oil for lubrication		75
Acids and soda used in process of manufacture		15
Insurance		70
Various other expenses not before included		400

£19,585

Receipts.

912 tons of sugar, at £25 per ton	£22,800	0	0
123 tons of sugar, free of duty, at £42, 10s.	5,227	10	0
49½ tons of sugar, at £36 per ton	1,782	0	0

1084½ tons	29,809	10	0
Pulp, 2800 tons, at 11s. 4d. per ton	5,586	13	4
Molasses 10 tons at £5 per ton	525	0	0
" " £5 10s. per ton	77	10	0
" " " " "	40	0	0

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In addition to the sugar factories I have alluded to, there are in use numbers of distilleries for extracting the beet. In France, the number reaches

500. The distilling of spirit is said to be profitable than the manufacture of sugar. On farms both processes are carried on, and a year ago—stimulated by the high price of raisins—the result of the vine disease—many such distilleries were converted into distilleries. I learned the other day, from a French engineer interested in a patent still, that he is engaged in the erecting of a large distillery near London, for extracting sugar from beetroot. The whole cost of the distillery is at £16,000. As the partners are people of experience they have doubtless satisfied themselves that the culties experienced by other persons are to be avoided. Hence the question as to making sugar from beetroot being a profitable process will speedily come to rest.

GERMAN FARMS.

After an inspection of the distillery at I paid a visit to the farms cultivated by The Company holds five farms, divided into of about 1500 acres, in all 7200. M. J. of the partners, is manager-in-chief, with under him at the several farms. The accounts appeared to be most accurately kept, and the farms and carefully managed. The course of crops—1st, rape, highly manured; 2d, wheat; 3d, slightly manured; 4th, clover; 5th, oats; 6th, sugar-beet, without manure; 7th, clover; 8th, clover; 9th, oats. Forty bushels per acre considered a good crop of wheat; of sugar-beet 13 tons per acre. As in France, deep ploughing is used for beetroot, 13 to 14 inches being the depth. I saw one field of beet, containing some hundred acres, and, on observing the leaves on certain plants to be crinkled, was told that it was an indication of good quality. The Vilmorin and the German varieties most highly spoken of. Great care is taken of the tap roots, as they are said to contain most sugar. Great care is also exercised in the growing of the leaves, especially in the latter stages of growth. Here, as in many other parts of the Continent, Indian corn is grown and cut green for stock. As I found in America, it is everywhere highly valued. I found that Browick wheat had been introduced, and, after careful experiments as to its value, it was preferred to any other variety. On these farms the use of the clod-crusher for corn land planted with wheat, was understood, but I found no other farm out of France did I find the value of the practice recognised. From this neglect in the management of the land, a large portion of the wheat of the Continent grows tall and weakly, and gets much damaged before harvest. A large number of working men, of the Birkenfield race; they are fed well. The men, as in France and other parts of the Continent, sleep in the stable with their bullocks and horses. The wages to farm labourers are high, and are from 1s. 2d. to 1s. 6d. per week in summer, and 1s. to 1s. 3d. in winter. Laborers

1 in almost every part of the Continent I have been becoming both scarcer and dearer, and in this district, wages have risen during the last five years from 25 to 30 per cent. Children are not allowed to be employed in agriculture until fourteen years of age; the Prussian system of education being a compulsory one. At this time to enter upon the question of education would observe that it seems to be appreciated, and farmers I conversed with found no practical objection, inasmuch as one portion of the children go to school in the morning and the other portion in the afternoon. I was told by one farmer that where the burgomaster happens to be a farmer, the school arrangements are not always so busy seasons; as my informant slyly said, the master sleeps.

The first farm I visited was a very beautiful place about a few miles from Cologne—belonging to and managed by M. Pfeiffer. It consists of 1440 acres, of which 1000 are in wheat, 360 in beet, and the rest in Indian corn, and potatoes. Two self-acting machines were in operation, cutting down some of the wheat, and a third machine stood ready to be put in motion upon this farm were very numerous, but, with the exception of those of English manufacture, they are rude and badly made; and, I think, this remark applies generally to the Continent. M. Pfeiffer fatts off 180 oxen a-year. His oxen work on alternate days, except those which are kept fresh in condition. These are put into a stall a few weeks, to make them up for market. The natural plan of working bullocks I found was followed by all the large farmers throughout the district to be the most profitable. In addition to the main force, M. Pfeiffer keeps twenty working oxen. M. Pfeiffer has a fine beetroot-sugar factory, in addition to the beet of his own growing, buys quantities from the neighbouring farmers. The price is 19s. a ton, 8 lb. per cwt. being deducted for the price of the pulp, which is prohibited. M. Pfeiffer preferring to consume it with his family. The wages on this farm throughout the year are 14d. per day; in the summer months the hours are from 5.30 A.M. till 8 P.M. The wages are 10d. per day. As in France and Belgium, in Germany there are a great number of small farms. In Prussia there are 900,000 farms of small extent. The small farms hereabouts are better cultivated than in many other parts of the Continent. As there really is nothing for the farmer to learn from them, it would be useless to make up your time in describing them. What I said with respect to the same kind of farm in Germany is of general application. Baron Elsner von Bismarck is a large landed proprietor in Silesia, is a practical agriculturist. In his district the four-course system is followed. The farming may be said to be what is considered a good average yield, 10 bushels of rye per acre, 10 bushels of wheat,

15 of barley, 16 of oats, and 5 tons of mangold. The wages of labourers in the district are 4d. a day in winter, 5d. in spring and autumn, and 7½d. to 10d. in harvest time. Labour is said to be becoming a little scarce, and wages are rising. Twenty years ago Baron von Gronow informed me that the wages were not more than 2½d. a-day in winter, and 4d. for mowing and binding an acre of wheat.

AUSTRIA.

Leaving Germany, I passed on into Austria, paying a visit to Mr Smallbones, a gentleman well-known to many in this room. I cannot, however, stay to describe this gentleman's beautifully managed place, nor the agriculture of that great empire with its farms of tens of thousands of acres. The homesteads are of immense size, as the animals are all brought home at night; if kept in the field they would be stolen. This practice of bringing home the cattle prevails throughout Europe. In Austria, a law exists against the subdivision of what are termed peasant farms, the maximum size of which is 60 acres, and the minimum 15 acres. When a proprietor dies, his eldest son takes the land; an assessor is called in, who fixes the amount to be paid to the other children; the eldest son, it is said, is often crippled by this arrangement. No class of tenant-farmers exists, all are proprietors, except in a few districts, and rare instances. The labourers, I find to be badly off, wages being about 9d. to 10d. per day. At one village I went to, I had an opportunity of seeing how they were lodged. One large barn-like building, with only a ground floor, I found divided into two rooms. In one, 40 feet long, 20 feet wide, and 10 feet high, I found six beds and four families; in the other, somewhat smaller, were five beds and three families. Small-pox having broken out a fortnight before, I was told some tenants of this wretched abode had been removed in order to thin it. There was one common cooking stove to the whole, and to add to the wretchedness of the place, it was infested with rats. A more deplorable scene it had never been my lot to witness. To return to Mr Smallbones, his cattle had recently been attacked with foot-and-mouth disease. As he had found considerable benefit from a certain remedy he gave me particulars of, I sent it home at the time, for publication in the newspapers. The remedy has been tried by many people in different parts of the country, and in all cases that I have heard of, with good effects. My own cattle have recently been attacked, and recovered very rapidly under the treatment. The recipe is as follows:—

“Take honey 1 lb., muriatic acid 1¼ oz., mix them well with a wooden spoon in an earthenware vessel; apply with a wooden spatula about a small dessert spoonful to the tongue three times a-day, leaving the animal to distribute it over the inside of its mouth by the champing motion which is sure to follow its application.” For the feet: “Take alum ½ oz., rectified spirit ½ pint, alum ½ oz.,

them in 1 pint of water; mix, and apply a little twice a-day between the claws." In addition to the above treatment, rye-meal, ground very fine, should be placed in the manger, a little being dusted on the noses of the animals, in order to induce them to eat; the meal being almost impalpable, they could lick a little without increasing irritation.

On leaving Vienna, I passed through the beautiful country of Styria, and crossed over into Italy. Before, however, I say anything upon the agriculture of Italy, I would take you back for a few moments to Belgium.

BELGIAN FARMING.

As Dr Voelcker and the Editor of the Royal Agricultural *Journal* have recently spent some weeks in Belgium, with a view to the early publication of a report upon the agriculture of that country, I shall content myself with a very brief sketch. Belgium has long had the reputation of being the best farmed country on the Continent. I had so often heard it held up by English travellers as an example to the world—I had read such glowing accounts of the farming to be met with over there—that when I saw the country for the first time with my own eyes, I must say my expectations were very far from being realised. Certainly no one can visit Belgium without perceiving at once that the country is occupied by an industrious race, and that great pains are taken in the cultivation of the land; but to one who is acquainted with the highest style of farming—who knows what appliances and requirements are needed for carrying on such farming—as such an one rides through the districts occupied by the cottiers and small farmers, he cannot but be impressed with the absence of the necessary capital for the full development of the resources of the soil. These remarks do not apply to the fine large sugar-beet farms I shall shortly allude to; but great farms, as I will shew presently from figures, are the exception in Belgium. I can readily understand how people with a slight knowledge of rural affairs may be misled on paying a visit to that country. A great deal of the land is naturally rich, and a large breadth being grown with coarse corn, rye, bearded wheat, and sprat barley, the crops under these conditions of course looked big, and their bulkiness is calculated to deceive the uninitiated. I remember, at one of those enjoyable Tiptree gatherings, hearing a London wine merchant exclaim, "What a fine field of Rivett's wheat, 'What magnificent barley!" Like France, agriculture in Belgium is the possession of a State department; and, like France, the land is much sub-divided. There are about a million peasant farms under 2 acres, about 100,000 farms of 30 acres, about 10,000 farms of 100 acres, and about 1000 farms of 250 acres and upwards, the average being about 11 acres. Rather more than half the country is cultivated by the owners themselves. But in Flanders, however, there are few farms; the rent of land, as has been asserted, is

by no means extravagant; nor do I think you will conclude that the peasantry are overpaid. In Hainault, the highest rented province—very fine land—according to the last official returns—the rent averaged 35s. per acre; in Luxemburg, the lowest, it was 12s. 9d. per acre; the average throughout Belgium was 27s. per acre. The average wages of the farm labourer is 1s. 1d. per day, without food, the maximum being 1s. 8d., and the minimum 8½d. per day; wages, nevertheless, are said to have advanced 25 to 30 per cent. since 1846. These figures were given to me by the Inspector-General of Agriculture. From inquiries I made among the older labourers, I found that 6d. per day was no unusual pay but a few years ago. I had travelled through Belgium several times, but had never set foot on a farm until last year, when I went over to Brussels to act as a judge of implements. The trial of mowing machines took place a few miles from the city. The meadow selected was naturally a rich soil, but the crop of grass was poor, and the field had evidently not been invaded by the roller for many a long day. The farmer attributed the poorness of the crop to Providence—he said he had expected a better one, as he had got the priest to pray for it! I remarked that Providence should not be held responsible for the omission of rolling; whilst my colleague, M. Hamoir, dryly told him that he thought the prayers would be answered if he put on plenty of dung! I mention this as one of the many instances I have met with of superstition. It is not an uncommon sight, especially in the Rhenish provinces, to see the image of a patron saint erected at the head of the field, in the hope that the crops would be thereby protected. On the occasion of my visit to Brussels Show, I went across the plains of Waterloo; it was just previous to harvest. The farms here are large, much of the land is fine, but neither my brother nor I thought the crops, considering the fine season, were what we should be satisfied with, nor had either the hand-hoe or horse-hoe been kept going; the poppy and corn-flower were in great luxuriance.

In July last, landing at Ostend, I stayed there a few days, and made excursions in the neighbourhood. The farmers seemed plain, plodding people, knew very little of what was going on in the agricultural world, their houses seemed comfortless, and their living very frugal. The rotation of many farms is rye, oats, potatoes, or sugar-beet, then rye; no wheat. I found very little in farm practice worth noting down. Ploughing up the land before the crop is carted is general in this, as well as in most parts of the Continent. One farmer shewed me his flock, of which he appeared very proud. The Flemish breed are long legged, small-scragged, narrow animals, which cannot pay the farmer to breed. The same man had some really good shorthorns and pigs. Boars in this neighbourhood travel like stallions, fresh blood being obtained every year. The labourers seemed dejected and in a low condition. I looked in at a village inn and had a conversation with the landlady, from whom

that she never saw a farm labourer in her apt after dinner on Sunday, when a drop in to have a glass of beer. She my picture of their condition, remarking, "gs! they have not much comfort in this life." eer's, at Oostcamp, near Bruges, I found a of things—good cattle, Hampshire Down shire sheep, white Yorkshire pigs, better -ter-fed labourers, and higher rents. The ots the following rotation:—Wheat, rye, ; flax, potatoes, or mangold. Two, and, case, three white straw crops in succession uncommon practice; to an Englishman it entific, and none but thoroughly good land stand such treatment. The Baron thinks : practice of growing a little chicory, which May; the tops are cut twice during the l autumn for green food; the roots remain nd all the winter, and are said to be the , give ewes after lambing. At Beernem, beyond Baron Peer's, is a large Govern- natory, well worthy of a visit; a farm of and a garden of 40 acres are at- he lads receive an excellent training; not time to describe what I saw. You ess have an opportunity of reading an he institution in the report of Dr Voelcker kins. I would refer members of the Club able information from Baron Peers, which d in the appendix to my paper; also to that rc, Inspector-General of Agriculture, who supplied me with statistical and other

les from Brussels is the parish of Dilbeck, :750 acres. In this village, which may be an average specimen, there are five or six ; to 150 acres, ten from 37 to 45 acres, ut 20 acres, and a large number of 2, 3,

M. Verheyden is the principal farmer of occupying 140 acres, at a rental of £240, lain, but keen, thoughtful man. The ers work for the larger ones, and get 1s.

M. Verheyden told me that the small ve the cottiers could never live and pay y mere farming; that the mainstay was bles, and poultry; that, if not too far from , a steady man with a careful wife might e rent of a 10-acre farm, with house, is er acre in this parish; and he further said ms in his neighbourhood were increas- ; that wages had more than doubled— ; ago they were only 6d. per day, without es are for nine years, without covenants as

He informed me, in reply to an inquiry, were no politicians, and voted as their hed. I heard from M. Verheyden a good ctical matters, but I must not dwell, to say something of the finest farm elgium, viz., that of M. Dumont, at

Chasspart, near Fleurus. The extent is about 1500 acres, divided into five farms, with a home- stead to each. At the central homestead is a large sugar factory and grain distillery. The homesteads are connected by iron tramways, which intersect the whole farm; 12 kilometres, or 8 miles, of tramway in one farm was a novel sight. The rail is used to bring home the beet and other crops; to take back manure, pulp, &c. I had been for days previously among the cottier farmers, who use great wheelbarrows for carry- ing on their crops. Two-thirds of the land is the property of M. Dumont; the other one-third is hired. The rotation adopted is—1st, beet; 2d, wheat and oats, half of each; 3d, clover and flax, half of each; 4th, wheat. M. Dumont adopts the English practice of cutting wheat before becoming quite ripe. The almost universal practice on the Continent is the very uneconomical one of leaving it till dead ripe. I saw one splendid field of sugar-beet of 175 acres, which was estimated at over 20 tons an acre. The tops of the sugar-beet are cut off, and given to the sheep on the pastures. An acre of flax is, on the average, worth £21. M. Dumont keeps over 600 head of cattle. Large numbers are fed upon pulp and the residuum of the distillery. Pleuro-pneumonia has made such ravages that M. Dumont and many others have adopted the practice of inoculation; the pus is obtained from the State Veterinary College, and inserted at the tail. If the operation is performed in hot weather the tail drops off through mortification setting in, but when done in cool weather no injurious consequences ensue. Having suffered much from this fatal disease among my cattle I was determined to try it, but have hitherto been prevented by order of the veterinary inspector of the county, who has acted on the advice of Professor Simmonds. The Professor opposes the practice; but those practical Belgian farmers who have had exten- sive experience regard it, to use M. Dumont's own words, as a "sovereign remedy." For foot-rot in sheep, M. Dumont gave me the following receipt, which he has found an unfailing remedy:—"1 lb. of Egyptiac, ½ lb. of sulphate of copper reduced to a fine powder, 1 ounce avoirdupois of bi-chloride of mercury reduced to a very fine powder; these materials should be mixed up with strong vinegar until they assume a proper consistency." The sheep are fed under cover, the prevailing plan on the Continent; a sheep-fold is a very rare sight. The food is 12 lb. of pulp per head per day. Wages on the farm are 1s. 8d. per day in summer, and 1s. 3d. in winter—no board and lodging; but the employment is *continuous*, and not *intermittent*, as in the small farm districts. The people seemed comparatively well off. Chasspart is in the Walloon district, Waterloo being in sight; it is the district for large farms; however, I passed a good many large homesteads unused, the land belonging thereto having been cut up into small farms. That such holdings required no homestead accommodation is a suggestive fact. M. Dumont's farm is one well

worth a journey to see, and the pleasure of my visit was greatly enhanced by the kindness and hospitable reception I met with.

Soon after my return from Belgium, I was greatly surprised at the contents of a letter addressed to the *Times* by the accomplished author of *Talpa*. Putting in a plea for "*petite culture*," Mr Hoskyns remarked, "that the number of beasts fed, and meat produced per acre, are far greater in Belgium than in England;" it is said that figures may be made to prove almost any theory. It is true that Belgium has 1,257,269 head of cattle, which is larger in proportion than the stock of English cattle; but to come to the conclusion from such a fact, that the Belgium meat supply is greater than ours, is a fallacy, as I will shew. In the first place, the draught power in oxen in this country is infinitesimal; in Belgium it forms a large proportion. In England as soon as a bullock is big enough he is slaughtered, whilst in Belgium he is kept on for years for draught purposes. Again, take the startling fact that whilst Belgium has but some half million sheep, we have over 35 millions, to say nothing of the superior size and weight of our animals. I feel convinced that were we in possession of full and reliable statistics it would be conclusively proved that England produces far more meat per acre than any country in the world, with, perhaps, the exception of the rich growing land of Holland. With the best information then at my command, and altogether waiving the question as to the number of oxen and cows kept in Belgium for draught purposes, I make the total quantity of meat raised per acre to be only 98 lb. in Belgium against 148 lb. in England and Wales. Except upon the large farms, very little stock is to be seen. The taxation of Belgium does not appear to weigh heavily on the land. There are no poor-rates—no taxation for the church. The cost of punishment of crime and the support of the prisons are borne by the State. The whole amount of taxation which falls upon the land is about 2s. 6d. per acre per annum. Schools for boys and girls exist all over the country. Education is not compulsory, but few parents neglect to send their children to school; the expense is borne partly by the State and partly by the parish. For information upon these and kindred subjects, I would refer members to the appendix to my paper, in which will be found a good deal of practical information from reliable authorities.

IRRIGATION.

I will now for a few moments direct your attention to the subject of irrigation. Some four years ago I spent a few weeks in Egypt. I was so impressed with the astonishing results obtained by the simple application of water to land in the valley of the Nile, that I came home under a strong conviction that in England, notwithstanding the difference between the two climates, we do not reap half the advantages we might do from the water which a beneficent Providence sends us. By the aid of very primitive pumps, by a mule or bullock, or a couple of donkeys,

sufficient water is often raised by the Egyptian farmer to irrigate 30, 40, or 50 acres of land, which fields produce prodigious crops of a kind of clover, called "burseem." My recent visit to Italy and Switzerland has confirmed me in this opinion. I am aware that water meadows in England are almost as old as the hills. The practice of irrigation is, however, confined to a very few localities—not one farmer in five hundred in England, I venture to say, knows anything of the subject, or has ever given the matter serious consideration; and I believe there are reasons which have produced the indifference, for which, I think, the State is in great measure answerable. To the consideration of this part of the question, I will return presently. The practice of irrigation in Europe is carried out on the greatest scale, and with probably the best results, in the plains of Lombardy and Piedmont. In Lombardy, out of a total area of 6,000,000 acres, upwards of 1,000,000 are artificially irrigated; upwards of 3000 miles of main or minor canals have been cut in the province, besides a vast extent of small arteries belonging to private individuals. Although some of the main canals are used for the purposes of navigation, they are mainly constructed with a view to a comprehensive plan for irrigating the country. The grand canal, which brings the water of the Ticino to Milan, has been in existence some 700 years, and for this long period has the practice of irrigation been carried on. I would also remark in passing, that for almost a longer period a portion of the sewage of Milan has been utilized; I believe the credit is due to the monks of the monastery of Chiaravalle. I visited some of the fields which had been irrigated for centuries; and, although not furnished with all the modern appliances to be seen at the irrigated fields at Bedford, the results are most satisfactory. I may mention that at Bedford the growth of Italian rye-grass by town sewage is a most complete success; as many as six crops have been raised this year, realising some £20 per acre.

I visited an irrigated farm of 90 acres near Milan, rented by M. Antonio Monti, and at which the water is used eleven times over, from the point at which it reaches the farm to where he parts with it to his neighbour. The rent of the farm is about 64s. per acre. The rent was considered a low one, as £5 an acre is not an unusual rent. The grass I saw growing was twenty-four days old, and was fit to cut. Seven crops had previously been mown since the beginning of the year. The grass in the irrigated fields is perennial. A good deal of the arable land is susceptible of irrigation. After a wheat crop cabbages are planted. The wheat in one field I saw was cut on June 24th; on July 7th the cabbages were planted, and on the 24th of August (the day I was there) the ground was completely covered. The cabbages are sent to the Milan market. The land was irrigated once before the cabbages were planted, and once after. On this farm I saw a fine dairy of eighteen Swiss cows. Having heard much of the milk qualities of this breed, I

into the quantity of milk produced, and varied from 38 to 44 gallons per day. The fed on grass from the irrigated meadows, and at noon and at ten o'clock at night. The lized for milk, which is fetched from the farm iver, is from 5d. to 5½d. per gallon. On of 90 acres, one-third is irrigated meadow, other arable. Six men, four women, and our lads, are employed. I would call special to the mode of paying the labourers. They 5d. per day all the year round. Each family dition one-third of the produce of 2½ acres n corn. The land is set apart for the by the farmer, who finds horses, implements,

The labourer performs the work, and gets of the produce. A good crop of Indian corn d to yield 48 to 54 bushels per acre. On this d another opportunity of seeing how the l- lodged. A box suspended from the stable roof a bed for the horseman. In some adjoining thout windows, I found several beds. One man rn with the fever, I speedily made my exit, but more wretched and indecent can scarcely be . Families never have more than one room,

two or three families occupy the same t. M. Chizzolini, who is an engineer by pro- id also a landed proprietor and farmer in the hood, employs a centrifugal pump, driven able engine, for pumping back the water has reached the lowest part of his farm, a which he is well satisfied. The watered Lombardy present a most rich and luxuriant ce; the kind of grass is the very opposite of grass found on some of the western plains of which, as the Yankees say, is "as crisp as wants lathering before you can mow it." On ie plains of Lombardy I passed over the witzerland. Everywhere along the hill-side : seen devices for catching and spreading the the grass slopes; then, again, it is arrested on the valley, and turned over the meadows and raize; indeed, as the fertility of the country upon the utilization of the water, every little turned to the best account. In the neigh-

of Verona I had an opportunity of examin- Metayer" system; the cultivation was very and the crops scant. The influence of the may be judged from a remark made by one any of farmers, and endorsed by the rest, saved them from anxiety." I thought with- ty our own agriculture would have been in I found theirs. When in Spain some years ssed through districts which, in the time of s, were most fruitful, through being irrigated, h, through the neglect of the Spaniards in aining the works left them by the Moors, are n wastes.

CONCLUDING REMARKS.

wing my observations to a conclusion, I mark that the question is often asked by

thinking men, what is the next great step which can be taken in agriculture? I remember some three years ago, no less a man than Mr Gladstone, when talking to Mr Clayden, Mr Leeds, and myself, upon increasing the meat supply, propounded this very question. I smiled, and remarked as gravely as I could, that I did not see how we could make another move until he repealed the malt-tax. In England, cultivation on the best farms has arrived at a state of perfection in the growth of cereals and root-crops, that I believe it is idle to expect any very great increase in the production per acre—the general average of the country will unquestionably be considerably raised. I am now speaking solely of the highest style of farming, with a view to discover what next step is possible. I take it that the great question of the day is—not so much how many more cattle or sheep can be fed on bought feeding stuffs, as how they can be raised and profitably kept upon crops grown upon the farm. In other words, how a greater supply can be economically produced. I believe no gentleman present will differ from me in the opinion that, if upon a given portion of his land, especially if friable soil, he could always command a supply of water for irrigation, a larger quantity of green food could be raised, and if so, it would furnish the means of keeping a greater number of animals. Is there any great difficulty, mechanical or otherwise, in placing the power of irrigating the lands in the hands of a vast number of English farmers? Along our valleys, where water is to be obtained in abundance at a few feet from the surface, a centrifugal or chain pump, worked by a horse or an engine, would supply sufficient water for the irrigation of scores of acres. More, however, than this, I take it, is required; the water in our rivers, I maintain, should not be the exclusive property of individuals, but be free for the good of the whole people.

M. Durand, a French agriculturist of remarkable energy, alive to the importance of irrigation, determined to avail himself of the water of the Aveyron. For this purpose he turned a branch of the river, constructed a small canal 2 miles long, and erected a weir at the junction. With the earth dug out he made an embankment, to prevent the flooding of 50 acres of his land, whilst on other 75 acres he turned the water brought by the canal; this arrangement enabled him to keep double the number of cattle and sheep, as well as to raise one-third more corn. For thirty long years, however, he was at war with opponents, but at length he succeeded in putting down all opposition, and was rewarded by the State with a gold medal for the work he had accomplished. The rivers and running water of France are not under the control of private individuals, as in England. The water only belongs to the owner of the land through which it flows during its transit; when it passes his boundary he has no further control over it. So long ago as 1669, Louis XIV. abolished the feudal rights of the proprietors in rivers, the ownership thereof bei- reserved by the State. Owing to the want of y i

France, the great boon secured by this enactment has not been taken advantage of to any great extent. Far be it from me to advocate such spoliation or confiscation as was adopted by France, but I sincerely wish that the Rivers Commission, which is yet pursuing its inquiries, may see its way to recommend to our Government the placing of all rivers and watercourses under a central authority, having power to buy up the acquired rights of individual owners, in order that the water of the rivers, not only for irrigation, but in other respects, may be as free for the benefit of the whole people as the air we breathe. I would also express a hope that the Commission will see its way to some plan for securing our rivers and streams against being polluted by the fertilizing matter which now runs to waste.

I have called attention to the wages and state of the Continental peasant more prominently than I should have done, in consequence of the condition of the English farm-labourer having of late occupied so large a share of public attention. Whilst I am sensible of the degradation and comparative poverty of the peasantry in some parts of our own country, and whilst I am a strenuous advocate for the better housing, the better education, and the adoption of other means of raising their position, I say fearlessly that their condition is superior, and if they would spend less in beer, would be incomparably superior to any of the same class upon the Continent. I was talking over this subject the other day, with two of my own men, who are engaged going about to start machinery. In this employment they have during the past ten years travelled half over Europe; they were both brought up as agricultural labourers. One said to me, speaking of the Continental labourer, "Poor things, I have often pitied them; they do live hard with their black bread and broth, and cabbage and red-herring, and such like." He also said, "You know, sir, they can't do what I call a day's work, for there is nothing inside 'em." This man, though no political economist, remarked, "You know, sir, their labour don't cost much, and their masters don't get much work out of 'em."

The notion that a minute sub-division of land has a tendency to raise wages is a great mistake. Go into almost any part of England where small holdings predominate, and there will be found not only a lower scale of wages, but what is worse, a want of continuous employment. In a tour I made last spring through the counties of Tipperary and Cork, I found precisely the same results; work on large farms was continuous; on small, intermittent. The same state of things I found to exist in every part of the Continent. Another conclusion I have arrived at is, that in all countries nothing tends to keep back agriculture so much as insecurity of tenure. Leases are all but universal on the Continent, but wherever I went there was the same complaint, the same reason for not making permanent improvement, the leases were said to be too short, tenure too insecure. The province of Groningen in Holland possesses, I believe, the greatest

agricultural wealth of any part of Europe; here the tenancy is hereditary. I mention this not by way of advocating the principle of fixity or perpetuity of tenure, but as a proof that the tendency of *length of tenure* is to increased production. Whilst I am opposed to the land being cut up into small holdings, I would not have it supposed that I think it desirable a whole country should be divided into monster farms. To such a state of things I am equally opposed. I believe that to be the best condition of things for all interests, when there is a considerable variety in the size of farms, so that a farmer with a family of sons has a chance of finding for them a choice of holdings suited to the means at his command. In many estates I think we have gone far enough, too far in some parts of England, toward the utter extermination of small farms. I maintain that a few—and mark, I say a few; too many would be as great an evil as none—a few even of cottier farms, with a good orchard and well-stocked garden attached, which the industrious, thrifty peasant might look forward to occupying when he begins to decline in life, would tend to cheer him along in the path of labour, and would, I believe, do more to elevate the class than all the prizes given at our agricultural meetings; and the large farmer would, in my opinion, be benefited by securing the services of a better class of labourers. Lord Lichfield, on a part of his estate, adopted some such practice; and the little farms with convenient homesteads at low rents are offered to the most deserving and thrifty of the older labourers as prizes for good conduct.

On the general question of large and small farms, I have no hesitation in pronouncing in favour of the former. I would call particular attention to the fact that even the Trades Union League or Congress, which met at Brussels a year or two ago, condemned the system of "*petite culture*," and resolved that when communism or community in land was gained, in order to produce food cheaply, it would be necessary to farm on a great scale; so that, as was argued, the rapid processes and costly machinery found so economical in manufactures might be brought to bear with effect in the cultivation of the soil. With the land cut up into small farms, that a greater number of people can manage to live or exist upon it, is undoubtedly true, but the question then arises, what is the more desirable condition of things—a system under which the greatest population can subsist upon a given area, or a system under which the largest amount of food can be raised at the least cost? That the small farmer can produce as cheaply as it can be raised on a large scale, I apprehend no practical man will maintain; and again when the conditions are favourable, as in Belgium the crops of the cultivator of a few acres are, as a rule, far inferior to those of the large stock farmer. There are many writers at the present day whose only notice about the use of land is, how it can be made to support the greatest population. Lord Palmerston once made the—since trite—remark that "dirt simply meant matter in the wrong place." So of over-population

en a broad view is taken ; when it is considered what lions of acres of virgin land throughout the world ite the industry of man, upon which he could subsist comfort and independence, we must conclude that there is such thing as over-population ; a wise and beneficent evidence has given us a world large enough—yea ! r larger than is required for the present family of un. Take alone the great prairies and plains of the 'estern States of America, capable of supporting billion on millions. I remember the impression the ght of these made upon me. It occurred to me that ord Palmerston, on seeing them, would have exclaimed, Over-population ! why, it simply means men in the rong place ! " The system of "*petite culture*" pursued in France and other parts of the Continent has undoubtedly this injurious effect. Under such a system, the creation of a class of intelligent tenants with efficient capital to develop the resources of the soil rendered impossible. In England the power of the oil to produce corn is maintained chiefly through the medium of restorative crops consumed by cattle and sheep. The proportion of crops in England and otland is one-third exhaustive and two-thirds restorative. In the beetroot districts, France and Belgium have followed the example of England ; but over wide extent of the country the system of cropping allowed is exhaustive. The simple object of the cultivator is the raising of corn and other crops which can be at once taken to market and turned into money. What I say of France on this point is true of every country in the world where farmers are without capital—they cannot afford to wait for the more

slow but more certain results obtained by the more scientific practice of modern agriculture. Our agricultural statistics in England are not very reliable ; I wish, only for the sake of drawing comparisons, they were more exact.

An eminent French professor of agriculture, after full inquiry, and a long tour in this country, calculated that with less than half the extent of cultivated land, England produced double the quantity of animal food, and, in proportion, nearly twice the quantity of corn. In England, the bare fallows are only one-tenth of the extent of corn crops, whilst in France one-third annually is in fallow. This will, to practical farmers, sufficiently indicate the difference between the system produced by the two countries. I believe the different results in the two countries are not altogether attributable to existing conditions ; a great deal is to be accounted for on the score of difference of race. I have seen Lower Canada, and I have seen Canada West, and the difference between the energy of the two races is palpably written on the face of the two divisions. English self-reliance, English perseverance and energy of character, have overcome difficulties which the French, notwithstanding the aid offered by Government, have been unable to conquer. I would say, in conclusion, that I verily believe, were "*petite culture*" become as general in England as in France and Belgium, meat would, with our teeming and ever-increasing population, soon be at famine prices. I would finish by remarking that I have yet to see the country which can compare in agriculture with our own beautiful little island.

Papers by Tim Bunker.

NO. XXIII.—TIM BUNKER ON MAKING TILES.

MR EDITOR,—I didn't like it a bit, that you did not come out to attend Sally's wedding. You must know that weddings do not come every day in a farmhouse, and in mine they come only once in a generation, for Sally is my only daughter. She had got her heart very much set upon seeing you out here, for she and John have read your paper so much, that they think you sort o' belong to the family. John came back with that young buck of a reporter you sent, quite crestfallen—declared he wouldn't have gone to the station if he had known you were going to disappoint him. He says he has made up his mind, since reading that account, that all the green things in the world are not in the country. Whether he means that some of the houses in the city are painted green, or the folks in them have that look, perhaps your reporter can tell. The girls, however, were amazingly tickled with the man's description of the Hookertown women, and are a good deal provoked that you didn't publish the poetry and all. They say if you will put in the part that you threw out, they will pay double price for it, as an advertisement. I suspect they have a great itching to know if he said anything more about them. You had better keep him at home in future, if you want him to do anything more for the paper.

I told you, a while ago, that if you wanted to see anything of the Hookertown of the present generation, you should come soon. I was a good deal more of a prophet than I thought of at the time, for the paper was not very on which I wrote it, before I heard that a main-tile yard had been started in my own neighbourhood.

"Who would have thought it?" exclaimed Seth Twiggs, as he knocked the ashes out of his third pipe, and rose to go. "Why,

Squire Bunker, that is the strangest thing that has happened in my day. I should as soon expect to hear they were catching whales in the Thames."

"And do you think there will be a call for the tiles?" inquired the minister, whose conservatism was a little disturbed by the advent of a tile-yard in his parish.

"Trust Miles Standish for that," answered Deacon Smith. "The fact is, Standish never went into anything yet, that he did not see his way out of it before he started."

"Blamed if he hasn't got it all ciphered out," said Twiggs. "Shewed it me 'tother day when I was up there."

"And how many does he calculate to sell?" I inquired.

"A hundred thousand the first year, and half-a-million the second. Had the hundred thousand engaged before he started."

Miles Standish owns the ancestral farm; and on one corner of it is a clay bed, of unrivalled excellence. It has been used for some years as a brick-yard, and many a kiln has been sent off to the neighbouring city, and down the river. But the demand for bricks having suddenly ceased, Miles has been in trouble ever since, until I hinted to him carelessly last spring, that he had better go to making tiles, and drain his farm.

But it will probably never be the best way for every man to try to make his own tiles. Our farms are too small, and, as a rule, our farmers have not the necessary capital, even if they have clay beds. What we want is a tile-yard in every neighbourhood or district of twenty miles diameter or less; so that a farmer can cart tiles to his farm in the leisure parts of the year. He can, in this way, make his horses serviceable, which would otherwise lie idle. He will not feel the expense of freight at all; for as matters now are, freight

at bugbear which prevents people
g to drainage.

g of the tile-yard, I went up to see it
and to have a talk with Standish

I found the hint I dropped in half
spring had fallen into good soil,
earing good fruit. He had got it
d out, as Seth Twiggs said.

“Squire Bunker, I’ve thought a
what you said about turning my
into a tile-yard, and you see I’ve
e it. The only thing that stumbled
hether I should have any market
as after I got them made. I looked
arm, and found that I could use at
thousand in draining some swamps,
se worked well, I should probably
e. I went round into the neigh-
owns, and found a good many
no were willing to engage from one
usand a-piece. I disposed of a hun-
sand. You see I had a plenty of
make a kiln of for burning, so I got
p cheaply, and I have had only the
e tile-making machine to meet, and
make a handsome profit. If the
ks half as well as you claim, there
to be a better demand for tiles than
: was for bricks.”

Hookertown clay-bed is one of the
ever saw. You work right into a
where the clay is 50 feet deep, or
: lies in nice layers about the thick-
ate, and is entirely free from sand
:l. It makes very tough tiles. There
ough right here in this valley, close
nable river, to make all the tiles the
ill ever want.

st tile-yard in Hookertown is a great
d will work great changes among us.
uble the products of our farms in
ten years, if the farmers will use
: is wonderful to see the waking up
bject. I don’t know as I ought to
t I thought you would like to know
: Frink has engaged five thousand
is going to put them down this

It won’t be a year before Jotham
rass will have them down in his
wamp; but he will never own that

he is draining land. It will only be another
contrivance to keep out the rats and the eels.
A very *curis* man is Uncle Jotham.—Yours
to command,

TIMOTHY BUNKER, ESQ.

[REMARKS.—We are really sorry for the dis-
appointment felt by our Hookertown friends,
at our failure to appear at the wedding, but
could not help it possibly, under the circum-
stances. We will do anything by way of
atonement—attend Sally’s second wedding
or the next wedding that comes off in
Hookertown, should any of the damsels see
fit to get up one on our account. We shall
not dare to send any more reporters.—ED.]

NO. XXIV.—TIM BUNKER ON THE CLERGY AND
FARMING.

MR EDITOR,—I suppose you and the
rest of the folks have wondered some about
Sally’s marrying a minister. It does look
a little queer, at first sight, that a smart,
handy young woman, that knows all about
the duties of the dairy and the kitchen, and
takes premiums at the shows on bread and
butter, should want to settle in a village. It
is perhaps just as queer that the smartest
preacher in the county should want to marry
a farmer’s daughter. But wedlock is an un-
accountable affair any way you can fix it, and
the particular attraction, I suppose, is in most
cases as great a mystery to the interested
parties as to people outside.

But this match, it strikes me, is not so
much “out of sorts” as matches in general.
Josiah Slqcum, I guess, knows on which side
his bread is buttered. It strikes my neigh-
bours variously, according to their characters.
Uncle Jotham Sparrowgrass dropped in the
week after the wedding, and says he :

“What a fool you have made of yourself,
marrying your darter off to that Shadtown
parson !”

“A thousand pities—she was so smart !”
chimed in Seth Twiggs, as he knocked the
ashes out of his pipe, and looked across the
room to Sally’s mother, who was busy with
the needle.

“Why, what makes you think so ?” inquired

in the house, as well as to be a lady in the parlour, makes a good wife in any calling. I am quite sartain that her talents won't be buried in a napkin down in Shadtown ; for the parsonage has 10 acres of land with it, and Josiah is going to keep three cows and a horse, and grow stuff enough on the land to feed them and his family. His people say that he is not afraid of the plough tail or the hoe handle ; that he gets more stuff off his 10 acres than many of them are able to get from their farms ; that he is great on sermons, and just as great on cabbage, and it is difficult to tell whether he is a better farmer or minister ; and his wife and the young folks are pleased with each other, and as long as the parties most consarned are suited, I don't see why other folks need trouble themselves about it."

Mrs Bunker resumed her spectacles and sewing after freeing her mind, and Uncle Jotham found it convenient to leave on important business. Seth apologised handsomely, didn't mean any harm, and after finishing his pipe, retired.

You see, a great many people have got very narrow views about their neighbours in general, and ministers in particular. They think no man can be more than one thing at a time, because they themselves have never done but one thing, and have not done that very well. If a man is good with a lapstone and an awl, they think he must be a poor hand with a hoe and a scythe. But I have travelled enough to know that some of the best farmers and gardeners can turn their hands to a number of things. I have pretty much made up my mind, that that old saw about "sticking to the last" wants a new interpretation. If a man only sticks to the last, he may as well stick to two or three other things at the same time. The sticking to one thing is a matter of a good deal more importance than having only one thing to stick to. I take it, that brains are given to men to be used, and that if a man will use them, he can do about as much as he wants to.

Folks especially think that a bookish man cannot know anything about practical matters, and that a minister is as likely to ride

“And the whole neighbourhood came in there to grind their axes on rainy days, as I remember,” said Seth.

Jotham Sparrowgrass, sinner that he is, had not been inside of a church on Sunday in twenty years, and it must be confessed was a little more offish toward ministers than he ever was toward book farming, and that is a pretty strong statement.

"That is the way with you wimmin folks," responded Uncle Jotham, "always twittin a feller upon facts."

"Sally might have done better," said Twigg, as he tipped back his chair and ruffed away. "You see she was ought to have been a farmer's wife, she was so knowing about her things."

What Sally won't have any more to do with training in the dairy and the kitchen because she has gone to live in a parsonage. A girl that has been brought up to keep everything straight

with his face toward the tail, as any I am afraid that such people do not go ch as much as they ought to, and that not know enough about how ministers if there is any class of people that are danger of rusting out, that have plenty indoors and out, and know how to do e best way, I am sure they'll be found the clergy.

it has always been so. There is no men in the county that take more in farming and raising fruit than the rs. They take hold of the societies, ldresses, and talk about as much to int as any orators we got on such ns. And this is all orthodox doings re, and I think they preach all the for stirring around among folks, and g what they are thinking about. They en before they began to preach, and I there is no particular sin in their being erwards. At any rate, they do common a great deal of good, for entering into abours and sympathies.—Yours to nd,

TIMOTHY BUNKER, Esq.

ittle allowance might be made for Bunker's enthusiastic defence of the since his only daughter, Sally, has en married to one of them; but with out this allowance, we think the Squire out about the truth of the matter.—

XV.—AN APOLOGY FOR TIM BUNKER.

LETTER FROM JAKE FRINK.

EDITOR,—Square Bunker went by our this mornin jest arter sunrise on y to the depo. He sed he hadn't f time to write, but he'd like to have l you, that he had been called out, suddently on bizziness, and shouldn't k in sum weeks. He axed me to n his place this time, and I deklare I elt so kuris in my life—I han't got ederkashun, and never had, and I t help thinkin' the Square was krackin his dry jokes on me, when he put me ch a thing—guess he'd be more as l than the next man, if you should

take it into yer head to print this ere riting. But you jest du it, and I'll give you a crown out of my own pocket, for the sake of gitting the start on the Square for oncet. He is a hard man to beet i know, but Hookertown is a great country—and there is sum more peeple in it than you have heerd on. Them karrots, that Tim Bunker's allers runnin me on, I wa'n't so much to blame about—I'd like to have my sa on that subjeckt. Ye see, I knew mi man jest as well as the Square did, and a leetle better. I allers understood trade, better than farmin, and I knew i culd git the premium by a leetle kalkulashun. Now kalkulashun I hold to be the cheef eend of man, that which distinguishes him above all kattle-kind, and so i used it in the kase of the karrots and carried my pint.

Sum folks perhaps thinks, that all Square Bunker rites abeout is made up eout of his hed, kind o' novel fashun. I tell you it's a mistake. The hull on't is a rekord of fax, and pretty much as they happened, so that up heer in Hookertown they look for the Square's letter in your paper, to see what has happened. That story about the hosspond is all true as preachin, and a great deel truer than sum on't i guess. The bottom is all dry neow, and the lot is abeout the best one on the farm. That tile bridge was a kuris notion, and I must own beet on it. I might have thunk, and thunk, forever, and i should never have thunk that eout—but the watter rushes through there, as if it had been shot eout of a kannon. I dew declare I beleeve he greesed the plank, it goes so slick.

I don't kno what the Square has gone off fur—but I guess its to bi kattle. Kattle have been mighty low all the year, and the Square has plenty of hay and fodder, and makes a considerable bizziness of fattin kattle in the winter, tho' he han't sed any thing on that pint yit in the paper. Indeed he han't told half he kno's, and i spect he wont if he rites a dozen years. I guess hee'l git a new idee when he sees this in print. I never had a letter printed, and indeed, folks in gineral have never dun much for me, but Jake Frink is a man of his wurd, and will pay if you'll put it in.—Yourn furever, JACOB FRINK.

Our Library Table.

A Book about Roses; How to Grow and Show them.

By S. REYNOLDS HOLE. William Blackwood & Sons, Edinburgh and London, 1869.

THE Rev. Reynolds Hole, that most celebrated of modern rosarians, has written this book about roses because, having grown them for twenty years, having won more than thirty cups, "open to all England," having originated the first rose show—that is, the first show of roses only—and having attended most of the subsequent meetings, either as a judge or exhibitor, he ought to have something to say worth hearing to those who love the rose. Good and sufficient reasons, surely, for his undertaking the work, which must be hailed as a welcome addition to gardening literature by all growers and other admirers of "the Queen of Flowers;" while to the ladies it cannot fail in being additionally attractive, from the agreeable, racy, yet eminently practical style of the author, and its being dedicated to his wife. The dedication runs—

"There's a Rose looking in at the window
In every condition of life—
In days of content and enjoyment,
In hours with bitterness rife.

"Where'er there's the smile of a woman,
As bright as a beam from above,
'Tis the Rose looking in at the window,
And filling the dwelling with love."

Our author has divided his little book into fifteen chapters and two appendices. In the first two chapters he disposes of the causes of failure and the causes of success in rose growing. In chapter third he descants upon the charms of "Our Queen of Beauty" and the attractions of the rose garden, proving that as the rose is admired, so it may be grown by all. In chapter fourth, the position of the rosary, that too little understood subject, is discussed; and although "there is, alas! one locality, beneath that dark canopy of smoke which hangs over and around our large cities and manufacturing towns, wherein it is not possible to grow the rose in its glory," a list is given of those varieties which are most likely to repay the anxious efforts of city and suburban growers, who are recommended to plant them in the best place, and in the best soil available, avoiding drip, and the encroachment of other roots; manuring them in winter, mulching them in spring, watering them well below, syringing them well above, removing grubs and aphides whenever they appear, and applying sulphur as soon as mildew shews itself. Soils are treated of next in order; then, manures, arrangement, selec-

tion, garden roses, rose shows, roses for exhibition, how to show the rose, &c. Like the post of a lady's letter, the appendices contain much what many will consider the pith of the subject. No. 1 being a kalendar or memoranda of work for each month of the year, beginning with October "because, both he who desires to form, and he who desires to maintain, or extend, a rose garden, now make his arrangements for planting." In the second, two very useful lists are given; the one containing names of the best roses which have been introduced during the last ten years; and the other the names of rosarians who have sent out roses of superior merit during the last ten years, with the names of the roses and the years of their introduction. This is in unison with a recommendation which we have repeatedly made, that the names of originators or senders-out should be invariably appended to plants in all nursery catalogues; as thereby the vendors of indifferent and worthless kinds would be exposed, and they, as well as others, cautioned against the repetition of like malpractices; or that the public, by being thus warned, would, in a great measure, be able to avoid being imposed upon by their misrepresentations. Recurring to the list which has led to this diversion from the subject in hand, many of the roses of the last ten years, have assisted in deluging the rose market with worthless, yet expensive varieties. I should feel ashamed at the entire absence of names from it, or, if admitted, at the very few notorious varieties which are recorded under them.

Philip Vaughan's Marriage. By MRS FITZMAURICE. 1 vol. 8vo. London: T. C. New

WE are not given to review other than purely cultural books, but here, we must confess, we stumbled on a volume dedicated to a lady (Mrs J. Watney), who has for some time added to the interest of our pages, and has also done much to improve the household management of not a few of our fair readers. We can on this account scarcely decline to say a word or two regarding the volume before us. We shall attempt to give an outline of the story, as we think that by doing so we could not do it the justice it deserves at our own hands, and would, indeed, only detract from the pleasure which it affords to those who have an opportunity of perusing the volume. The get-up, both as regards typography and binding, reflects great credit on the publisher.

Practical Floriculture: a Guide to the Successful Cultivation of Florists' Plants, for the Amateur and Professional Florist. By PETER HENDERSON, Bergen City, New Jersey. Orange, Judd, & Co., 345 Broadway, New York.

HIS work is by the author of "Gardening for Profit," work which was favourably reviewed in our columns about a twelvemonth ago. The author is an Americanized sagacious Scotchman, and a Scottish-bred gardener, who has profitably practised the market garden culture of vegetables and flowers, in the vicinity of New York, for the last twenty years. Passing over a little Transatlantic "hifalutin" peculiarity of style, "Practical Floriculture" is both readable and instructive.

Most of the cultural, as well as structural rules and directions are eminently economical in their tendencies; although Old Country "practicals" are likely to be an exception to a few of them, and that not without good reason. All are, however, invited, not only to read and try, but to come and see the results produced by the methods recommended, so that they may judge fairly whether or not they are worthy of imitation. That these horticultural innovations are neither few nor unimportant, will appear from the author's statement, that he practised according to his early teachings until increasing business, and the dire necessity of saving labour, brought common sense to the rescue, and enabled him to cut loose from prescribed rules, to an extent that he can now produce better results, with half the labour formerly applied.

In the chapter devoted to "Laying out the Lawn and Flower-Garden," the author very justly remarks, that "the preparation for the lawn is too often hastily and imperfectly made. It is the foundation of all subsequent operations, and if imperfectly done at first, the fault can never be remedied afterwards. This fault is too often perpetrated, from the anxiety of owners to complete the grass sowing or turfing before made-ground is sufficiently consolidated; as well as in grudging the expense of clearing off reduced prices sufficiently low to allow of their being covered to the requisite depth of good soil for the healthy growth of the grass. "Two to five bushels of seeds are recommended for sowing an acre of lawn, according to the kind and condition of the soil, and that of the following kinds and quantity per bushel, viz., 12 quarts of Island bent-grass; 4 of creeping bent-grass; 1 of red top-grass; 3 of sweet vernal grass; 2 of Kentucky blue grass, and 1 of white clover. With the

exception of the sweet vernal grass and the white clover, neither of which are well suited for fine machine-kept lawns, we are quite at a loss to know by the provincial names given what the others are, and would feel thankful for a small sample of the seeds of each, for the purposes of trial and identification.

On the important subject of "soil for potting," our author discards all the bewildering mixtures usually recommended for different kinds of plants. His soil-heap only contains two ingredients—rotted sods from a loamy pasture, and rotted refuse hops from the breweries, in about the proportion of two of the sods to one of the hops. If the loam is rather clayey, more hops are used, and if rather sandy, less than the proportion named. If refuse hops are not attainable, thorough rotted horse or cow manure will, he states, do nearly as well. For a few fine rooting plants such as heaths, azaleas, epacris, &c., he uses two-thirds of the decayed refuse hops to one of loam, or when the hops are not attainable, leaf-mould from the woods will do in their stead.

In potting plants, he discards drainage materials of all kinds, holding, that in all properly made pots, draining only takes place in a very slight degree from the bottom, but almost entirely from the porous sides of the flower-pot; and that, crock or drain, a glazed, dirty, or hard-burnt pot, how you will see the soil quickly become sour, and sickly growth immediately follows. This growing of plants without the use of crocks, charcoal, or any other substitute, he has practised extensively and successfully, with all kinds, for fifteen years. In re-potting plants, he recommends washing instead of shaking off all the old soil, which has the advantage of leaving all the fibres or working roots intact, while by shaking the soil from the ball, the most valuable parts of the roots are injured. Plants thus grown are further stated to display remarkable vigour and health, beyond what their pot room would otherwise produce; and they are particularly valuable for distant shipment; while for saving of freight and carriage, plants are sent to great distances after undergoing this process of root-washing, and arrive in as fine order as if the ball of soil had been attached.

These extracts will indicate that this little book contains much which ordinary cultivators may neither have seen nor thought of; and although it specially treats of mercantile florist plant cultivation, amateurs and others will also find a great deal in it that is both interesting and instructive.

The Garden.

THE BOTANIC GARDENS OF ENGLAND AND FRANCE COMPARED.*

BY M. CHAS. MARTIUS.

FRANCE.

IN December 1580, Henri IV. published an edict authorising the formation of a fifth chair in the Faculty of Medicine at Montpellier, for the prosecution of "the study of anatomy during the winter months, and of the properties of herbs and plants, foreign as well as indigenous, during summer." The edict set forth that, owing to the want of such teaching in France, a great number of students were wont to betake themselves every year to the universities of Italy. A second edict of the same date sanctioned the formation of a botanic garden at Montpellier. These edicts were "*enregistres*" by the Parliament of Languedoc in 1595, and the following year the garden was completed. This was the first botanic garden in France, and contemporary writers—amongst whom may be named the celebrated agriculturist Olivier de Serres—spoke of it with admiration. The direction of the establishment was given to Pierre Richard de Belleval, a native of Chalons-sur-Saone, who, when a student of medicine at Montpellier, had won the good offices of Henri de Montmorenci, Constable of Languedoc, by his exertions during the epidemic of Pezenac which followed upon the terrible plague of 1580. In 1622, when Louis XIII. laid siege to Montpellier (which had become one of the places of refuge for the Protestants of the south), he sent over 1300 species of plants to the garden. Trembling for the safety of his treasures, Belleval carried the most pre-

cious specimens into the heart of the town. Nor were his fears groundless, for, under the direction of the engineer, D'Agen-court, the promenade of Peyrou became a part of the fortifications; a bastion was reared in the garden itself, and the blood of the combatants was poured amidst its devastated parterres. But on October 3, 1622, the place capitulated, and the garden was again established.

Belleval was unfortunate in his immediate successors, who were court favourites, destitute of every qualification for the office. In 1687, however, Magnot rendered good service by commencing the arrangement of the plants in groups of natural families; and amongst those who subsequently filled his place we find the names of Tournefort, Garidel, Seguiet, A. de Jussieu, Cusson, Commerson, Gerard, De Candolle, Delile, &c.

Before the formation of the Jardin des Plantes at Paris, the example of Montpellier had found imitators at Geissen, in 1605, and at Strasbourg, in 1620. The famous botanist Jungerman, who persuaded the Landgrave of Hesse to form the garden at Geissen, obtained the sanction of the Senate of Nuremberg to the formation of that at Altorf, in 1625. The gardens at Jena date from 1629.

Hitherto these gardens had been devoted to the interests of pharmacy and *materia medica*; the Jardin des Plantes at Paris had a more romantic origin. The ladies of the court of Henri IV. were great at tambour work, and the gallants of the day wearied themselves in quest of rare flowers for new designs. At one extremity of the city, where

Abridged from *Revue des Deux Mondes*, 15th December 1868: "Les Jardins Botaniques de France comparés à ceux de l'Angleterre."

lands the Place Dauphine, was an en- e belonging to one Maitre Robin, ecary and herbalist to the king, who ted plants from Holland, and drove a ng trade by selling bouquets to the ladies, and whose sturdy refusals to part nis bulbs and seeds had earned him the uet of "the Dragon of the Hesperides." e enclosure would appear to have been ne extent, for, in 1604, Robin published alogue of 1500 species which it cond. The work was dedicated to the lty of Medicine. Robin was patronised enri IV. and Louis XIII., and his son asian, who succeeded him, increased the er of different species in the paternal . to 1800.

ry de la Brosse, one of the physicians of s XIII., conceived the idea of a similar n, the expenses of which were to be e by the State, citing the example of tpelier in support of his project. Herou- the chief physician of the court, entering his views, the king was gained over, and rs patent were obtained for the formation *Jardin Royal des Plantes Medicinales*. was in 1626; but Herouard died, and iety of circumstances retarded the com- on of the purchase of the land until . La Brosse encountered a good deal oposition from the Faculty of Medicine, ie ground of his not being a member of fraternity, which fortunately proved in- tual, and the establishment sped and pered. In 1636, it contained 1800 ies; in 1640, 2360; in 1665, 4000. ie roll of La Brosse's successors appear names of Vallot, Fagon, Tournefort, ant, and A. de Jussieu.

igland entered the lists at a later period. first English Botanic Garden was formed ford in 1620. In Sweden, that of Upsal, ibed in after years by Linnæus, dates 1657. Botanic gardens were formed at rid in 1753, and at the Portuguese Uni- y at Coimbra in 1773. Since this epoch establishments have multiplied in all of the world.

umerous private gardens were also formed e collection of exotics. To enumerate

the latter at any length would occupy too much space, but it would be an act of injustice to pass over the names of a few which were illustrated by the labours of contemporary botanists.

Musa Brassavolus recorded the glories of the gardens of Belvedere, formed at Ferrara by Duke Alphonso II., once the patron—in later days the persecutor—of Tasso. The garden of Scipio Simonetta at Milan was described by Targio. Aldini delineated the plants in the garden of Cardinal O. Farnese at Rome, in a work bearing the date of 1625. In France may be mentioned the gardens of René du Bellay (the patron of Pierre Belon), and of Gaston d'Orléans, both of them contemporary with the formation of the Museum of Natural History at Paris. With d'Orléans originated the happy idea of having all the plants in his collection drawn upon vellum by a competent artist (one Robert). The drawings, at the death of d'Orléans, were acquired by Colbert, in the name of the king, and constituted the nucleus of the collection of botanical drawings upon vellum now in the Museum, and which has been kept up without intermission ever since. Towards the end of the 17th century private botanic gardens were sufficiently numerous. Conrad Gesner enumerates *sixty* as existing in Germany, Holland, and France.

During the 18th century a love of horticulture still prevailed among the wealthier classes, but everything was sacrificed to *style*: the continued contest between the French style and the so-called Chinese style, which had found favour in England, left amateurs little time for the study of the plants themselves. Holland was an exception to the general rule. In 1730, Linnæus, then in his twenty-eighth year, was presiding over the conservatories of a rich banker named Clifford, at Hartecamp, near Haarlem. Here the banana flowered for the first time in Europe, and the young botanist published a drawing of the wonderful tree, which he followed up with a catalogue of all the plants committed to his charge. The reign of Louis XVI. in France furnished a brilliant episode in the history of horticulture, in the labours of Bernardin de Jussieu,

who formed a Botanic School in the grounds of Petit Trianon, in which the plants were arranged on the natural method.

Bernardin de Jussieu left few writings behind him. A rough draft of his scheme reveals, however, the design of the originator of the method which was given to the world by his nephew and successor, Laurent de Jussieu. The school disappeared in the days of the first Empire; and a group of trees, which have been spared on account of their lofty growth, alone remain to mark the spot near which it stood.

ENGLAND.

The Royal Botanic Gardens at Kew, which, like the Jardin des Plantes at Paris, may be regarded as the botanical centre of the country, were originally the grounds surrounding the country house of Dr Molyneux, a distinguished philosopher of the reign of George II. At his death the property passed into the hands of Frederick Prince of Wales, and eventually to his widow, the Dowager Princess. In the reign of their son George III., numerous improvements were made in it, two conservatories were built, and the gardens received many valuable acquisitions from the voyages and researches of Captain Cook, Sir Joseph Banks, Flinders, Bowie, Masson, and others. Under the title of *Hortus Kewensis*, Joseph Aiton published, in 1789, a catalogue of 5600 species, all of them exotic, of which the greater part has been grown successfully at Kew. The grounds remained the property of the Sovereign until 1840, when they were handed over to the Department of Woods and Forests on behalf of the nation.

Despite a prior existence of more than two centuries, the Jardin des Plantes at Paris is now very far behind its English rival. The garden contains a considerable number of plants. In 1862, the species amounted to 10,000. The herbarium is as rich, though less extensive than that of Kew, and a collection of vegetable products has been commenced, which has now come to a stand-still for want of space. It contains all the requisite elements to enable it to take the first place in Europe, but has remained stationary for the thirty years. We have not to look far

for the cause. The sum devoted to the maintenance and improvement of the Kew establishment amounts to £25,000 per annum; that allowed for the gardens at Paris does not exceed £4000 (98,400 francs), including the sums required for the salaries of the officials, and for the purchase of new species. Not only is this allowance wholly inadequate, but the gardens themselves have remained in much the same state as they were in 1838. A law of 27th June 1833, authorised a loan of 2,550,000 francs for the improvement of the museum; and with these means two large glass houses were erected, and the buildings containing the herbarium, the museum, and the gallery of minerals, and the library, were thrown into one. This accommodation is now insufficient. The shrubs which in summer decorate the grounds, in winter are crowded and stifled in an orangery built in 1795, so that they shed their leaves the moment they are set out in spring. The conservatories, and the arrangements for heating them, were, no doubt, excellent thirty years ago; now they are out of date. Every department shews similar defects. At Kew, the plants, unconfined as on their native soils, grow freely, and wear their natural aspects. The same plants at Paris, cramped from their birth, often mutilated to economize space, neither blossom nor fruit, and are useless to the botanist.

The sum of £33 (800 francs) allowed for the annual purchase of new plants is ludicrously inadequate, and the museum is consequently dependent upon a system of exchange, such as is open to the humblest grower. If the "matériel" be insufficient, the "personnel" is no less so. Two professors and four assistant naturalists form the staff. Unlike their colleagues at Kew, the former are unable to devote themselves solely to the establishment, much of their time being occupied in teaching. As to the assistant naturalists, all of them men whose names are familiar to the scientific world, two of them members of the Institute, their salaries (£120 to £140) are so small as to preclude their attending exclusively to their official duties. In every particular, the establishment is defi-

he only wonder is, that the gardens
many resources to the botanist as

neglect contrasts strangely with the
towed upon the horticultural adorn-

Paris itself. It is matter for regret,
ile so much attention has been given
namental, so little should have been
of the useful. It seems, indeed, as if
ea of science had been studiously
l from our public parks and gardens.
its are never arranged in accordance
ir natural affinities. No attempt is
notify to the visitor the name, order,
c use, or native country of any plant,
late of its introduction into Europe.
ng is addressed to the eye, not to the
In England they regard these matters
y; and there horticulture and botany
hand in hand. . . .

gland, there are three botanic gardens
d by the State—those at Kew, Edin-
rd Dublin; but the Universities have
dens, and some of the principal cities
tanic gardens supported by public
ion. Of this character is the garden
ow, which contains eleven conserva-
ed with valuable plants.

urden at Edinburgh dates from 1670.
was changed in 1820, and it now oc-
commanding position outside the
ie total area is about 15 acres. At
: the stranger is struck by the large
f apparently delicate trees growing
en air in a latitude of 56 deg. N.
ears to be due to the fact that the
rky winters of Scotland are less try-
those of more easterly countries,
e nocturnal radiation is facilitated by
ness of the atmosphere. The bright
ts, so fatal to vegetable life, are very
dinburgh, and, consequently, plants
n stand damp generally do well. It
ess appears strange to find the oaks
ath of France, the plane tree, the
, the chestnut, the Portugal laurel,
is deodara, the sugar maple, flourish-
: open air, while plants which we are
ed to see growing without protection
id—such as the cherry, the vine,

the fig, the red gooseberry, &c.—are trained
against a high wall to shelter them from the
cold.

The palm-houses, of which there are two,
are constructed of masonry, with large win-
dows, it having been found that the palms
thrive better in stone buildings, where the
changes of temperature are less sudden, and
the light more tempered than under glass.

The smaller buildings contain, amongst
others, two interesting medicinal plants, the
Assafœtida and the Calabar bean. In the
museum a laboratory has been established by
Professor Balfour, the present director of the
gardens, where students are daily employed
in microscopical investigations. To Professor
Balfour is also due the credit of having formed
a small but interesting museum of the plants
mentioned in Scripture, minutely illustrated
by dried specimens and carefully prepared
drawings. Altogether, the garden at Edin-
burgh is worthy of the capital, and of the
chief university of Scotland. Its annual in-
come is about £1500, a sum which is suffi-
cient in a town where the price of labour is
low, and coal cheaper than in any other
country in Europe.

The Botanic Gardens at Glasnevin, near
Dublin, were founded by the Royal Irish
Academy in 1790, with a view to foster a
taste for botanical science, and to further the
study of its bearings upon agriculture, com-
merce, and manufacturing art and industry.
The gardens have been greatly enlarged, and
now cover an area of 14 hectares. There is
no general school of botany, but there are
several special schools, the utility of which is
unquestionable. A large space has been re-
served for the agricultural and horticultural
plants and fruit-bearing trees of Ireland, in-
cluding not only those already grown, but
those which might be advantageously intro-
duced. The garden is laid out like an Eng-
lish park, and, as at Edinburgh, the botanist
sees with surprise the plants and trees of far
more southerly climes growing in the open
air. The mildness of the winters, which is
altogether exceptional for this latitude, ac-
counts for the phenomenon.

M. Martius speaks with much pleasure of

his visit to Glasnevin. Amongst other points which appear to have struck his attention, was the persistency of the blooms on most of the plants. "When I visited the conservatories at the end of September," he says, "they were full of plants covered with bloom, such as in our own we see only in spring."

"This establishment alone," he adds, "gives an unequivocal refutation to the statements of those writers who have unceasingly accused the English Government of neglecting the best interests of Ireland." He continues: "If a comparison of the establishments at Kew and at Paris be disadvantageous to the latter, the same may be said of the provincial gardens of the two countries. In France, besides the Jardin des Plantes at Paris, there are two botanic gardens supported by the State—those of Strasbourg and Montpellier. Fortunately, the municipal authorities of other towns have wisely elected to devote a small portion of the funds at their disposal to the maintenance of these establishments, which contribute to the amusement as well as the education of the people. Some towns have, however, retrograded in this respect. Avignon, in days gone by, possessed a very valuable botanic garden, and a museum of natural history, founded by Requiem. Some years since both were removed to make room for the Avenue Bonaparte. The garden has never been re-established, and the contents of the museum have been dispersed. Bordeaux has a botanic school, under the direction of the learned M. Durieu Maissonewie. It, too, has had its existence threatened. Let us hope that it may find defenders in the municipal councils of so wealthy a city, where the love of science should be time-honoured as an art."

Amongst French provincial towns, the capital of Lorraine has done the most by far for the cause of natural science.

After spending 830,000 francs upon the building of a new college, the municipality voted a sum of 6000 francs for the formation of collections, and 1000 francs yearly for their maintenance, and 5000 francs for a new garden. They have subsequently

raised a sum of 50,000 francs on loan for the erection of a conservatory, to cover an area of 550 square metres. Toulouse remains content with a small garden, for which a sum of 5930 francs is annually voted.

"The garden at Strasbourg, which is very small, and in the centre of the city, can scarcely be regarded as a botanic establishment."

"This is not the case with Montpellier. The garden at the latter place covers an extent of $5\frac{1}{2}$ hectares. It has a collection of 2800 species, arranged according to a method suggested by De Candolle when director of the gardens, an orangery, and some other suitable cover for winter use. A school of *materia medica*, a school of forestry, and some public promenades, occupy the rest of the area; an extensive herbarium, a small museum, and a library, complete this modest establishment. In 1860, the Minister of Public Instruction ordered the construction of a conservatory, and the town purchased a hectare of land for its site. But, notwithstanding this addition to its size, the funds of the establishment were allowed to remain the same as in the days of the first Empire; 8320 francs being paid annually in salaries, and 4300 francs for other expenses, making a total of 12,620 francs contributed by the Imperial Government, and 200 francs by the town. This ridiculously inadequate income forbids all attempts at improvement; indeed, it barely meets the current expenditure. The hothouses are nearly empty for want of coke to heat them and a gardener to tend them, and the newly-purchased plot, sown with lucerne, remains in the hands of the municipality. Thus, in a town which prides itself upon being the scientific capital of the South of France, the second botanic garden in the Empire remains in the same condition as in 1813. The efforts of the Minister of Public Instruction are paralysed by the scanty funds at his disposal, and the municipal authorities, out of an annual revenue of over a million francs, contribute 200 francs (£8) to the support of an establishment older than the Jardin des Plantes at Paris, which has been, so to speak, the

cradle of botanic science in France, and which has been associated with the names and labours of some of our most distinguished naturalists."

In conclusion, M. Martius observes: "No doubt it may be said that the inferiority of our botanical establishments is a matter which need not cause us much concern; but to argue this is to ignore the intimate relations which subsist between every department of natural science. . . .

"Forty years ago, France stood at the head of the scientific world. Cuvier, St Hilaire, Lamarck, Latreille, Savigny, repre-

sented her zoologists; L. and A. de Jussieu-Desfontaines, Mirbel, Cassini, Du Petit, Thouars, Brogniart, De Candolle, and Lamarcke, her botanists.

"But then the Jardin des Plantes, the theatre of their labours, stood unrivalled. The provincial gardens at Montpellier could challenge comparison with those of Edinburgh. *Now*, our gardens and public museums are inferior to those of England, Germany, and the United States; and the illustrious men whose names we have recounted have departed, and left none behind to fill their places."

The Stable.

ANTIQUITY OF HORSE-SHOEING, WITH REMARKS ON THE HISTORY AND PROGRESS OF THE ART.*

BY JOSEPH GAMGEE, SEN.

THE Art of Farriery, *maréchalerie*, as it is designated by the French, was rightly appreciated, and its importance understood, by our neighbours, in the middle of the sixteenth century, and from that time no interruption in its progress occurred; but after the lapse of a century, another man appeared on the field, who took up the subject at the advanced point at which, under the impetus given to it by Solleysel, it had reached. That man was Claude Bourgelat, the projector and founder of veterinary schools. M. Bourgelat was a native of a town in the Department of the Rhone, near Lyons, was of respectable parentage, and born in 1713. He received a liberal education, having been trained up for the profession of the law, and pursued the required course up to being admitted to the bar.

This, the critical point in M. Bourgelat's life, often as it has formed the theme of writers, may, I think, be profitably dwelt on again for a purpose here. No well-informed man on the history and progress of the veterinary art, attempts to deny the first place of honour to the memory of Bourgelat as that of its greatest reformer, any more than men in other walks of life refuse to recognise the names of leading characters of all countries, who have opened paths and displayed new lights to their followers in the pursuit of human thought and action; but there are those who try to persuade others that a man may change his pursuit of business at mature age with impunity and even advantage, and when the inference is applied to our own profession, and that of surgery, names, those of Bourgelat and John Hunter,

are adduced as examples, asserting that the first was bred to the law, and the other to the carpentry business. Some writers on the life of Bourgelat adduce a sensational tale, to account for his relinquishing the legal profession, and creating for himself a new one—the veterinary science and art. It has been assigned as decisive, that, whilst pleading in a horse cause, an unfavourable, and, as he believed, unjust decision was given against his client. But the more creditable among his biographers make no mention of such incident, too trivial to sway the mind of such a man. I can, I think, see quite different reasons for his espousing the new love, and abandoning the course which probably he never loved, but which had been chosen for him by a good father. The provincial schoolboy and law student, with large mind, and a thirst for knowledge of natural things—the animal world in particular—was most likely a much better horseman than barrister at the age of twenty-two or twenty-three years; and, assuming such to have been the case, no course of mental discipline could have been suggested more advantageous for the future planner of new methods of teaching the art he determined to embrace. Some of what I have just sketched is, I acknowledge, assumed, as all that has been said on the other side is; but now we can take cognisance of Bourgelat within the sphere of the veterinary profession, where, by following up his subsequent course, it may be seen that his actions form the best evidence obtainable, of stern resolution and pre-determined method, which led to the highest post of distinction among the scientific inquirers of that age.

ro, we are told, proceeded from his
rn to Lyons, where he had an uncle
at the medical school, as teacher of
and surgery. Under that gentleman,
Bourgelat entered on the study of ana-
tomy and comparative—of the horse in
. He also learned the art of horse-
under able riding-masters; and like-
other subjects necessary for his
jects, such as a medical school of
and city in France afforded oppor-
r.

Bourgelat occupied himself through-
out the interval that elapsed before we
were fully installed in a new sphere, we
scanty means for judging—little
by the fruits which time revealed.
His pursuits are made manifest by the
existence of original papers in the "Encyclo-
pedic" and periodical journals of Paris and
the time.

In 1777, when he was thirty-four years
and about ten or twelve years
threw off the toga, we find Bourgelat
in England, residing at Lousanne, and
and engaged in translating the Duke
of Artois's work on Horsemanship into
French, to which he made additions and com-
ments. That task of rendering the work of
a French countryman available to Conti-
nental readers, was so well accomplished, that
it met with its new dress that it encountered its
reception in this country, and its reno-
wored the satisfaction of seeing it re-trans-
lated into English.

Horse-shoeing was the branch of what had
been denominated the veterinary art to
the founder of the schools attached most
to the cause, and for the effective instruction
he took most pains. As soon as the
veterinary college established at Lyons
gave proof of its usefulness, Bourgelat
obtained the commands of his sovereign to
found a similar institution at Alfort, in the
north of Paris; and the second school
was accordingly planned, and opened in 1765,
the founder of both was promoted to
the principal directorship, and to preside over
it at Paris.

The first veterinary colleges were so

wisely founded, that no radical changes in the
discipline pursued from the first have been
needed down to the present time.

Able and accomplished as their founder
was, perhaps, after all, his success was due to
great administrative ability, and his making
choice of the best men that could be found
to co-operate with himself. One remarkable
instance in support of this view is seen in the
provisions he made for securing practical
instruction, and practical work to be done on
the part of his pupils, in the art of horse-
shoeing.

Bourgelat made choice of a man for his
chief assistant, when he opened the Alfort
College, who was reputed the most expert
horse-shoer in Paris. That man was Chabert,
a name renowned in the annals of veterinary
literature. He was successively raised to a
professorial chair, and on the occurrence of
the death of Bourgelat, in 1779, M. Chabert
became his successor in the directorship of the
veterinary schools. I find on reference to the
"Nouvelle Biographie Generale," that Philibert
Chabert was the son of a farrier at Lyons,
where he was born on the 6th January 1737;
and that he died at the College at Alfort, 8th
September 1814. The list of his published
works is too long to be reproduced here.
This farrier's son—himself the first among
horse-shoers—was decorated with the order of
the Legion of Honour by Napoleon in 1805.
It now appears to me, that, while Bourgelat
brought the highest conceivable qualifications
to the execution of his plans, not the least
source of his strength lay in his understanding
of the weakness of man individually, and of
himself in particular, relative to the work to
be done. It was, therefore, by the com-
bination of talents, and co-operation of men,
that he sought to gain his cause, and did
gain it. Having provided teaching means,
place, and staff, the director propounded a
programme for the regulation of pupil candi-
dates for admission. It was foreseen that
the success of the undertaking, viewed in all
its aspects, would be in accordance to the rules
laid down for teachers and pupils, and the
observance of the rules. All French subjects
were admissible to the colleges—to be taught,

boarded, and lodged, at an annual fee of about £20—with the conditions, that they produced certificates from their parish authorities of date of birth and good character, and of their not being less than sixteen, nor over twenty-five years of age. They were further required, on presenting themselves, to submit to examination, and give proof of their ability to write their own (French) language, to solve given rules of arithmetic, and that they had devoted as much work to the farriery art as enabled them to forge a horse-shoe. And, so qualified, candidates were admitted, and divided into classes, according to entrance and progress. Four years were made the minimum time admissible for the obtainment of the diploma giving authority to practise the veterinary art.

Under these combined provisions, France was not long before she attained the object sought—a body of well-educated veterinarians, and a most efficient and intelligent class of working horse-shoers; the one in perfect accord with the other; in fact, no disunion, but complete blending and mutual dependence of work. Not an isolated, unrecognisable

“theory,” on the one hand, and degraded skill shut out in the cold on the other.

Under Bourgelat's plan, the veterinary art was elaborated into a great whole, to be worked out by men placed in harmony in their relative spheres. Nor have the teaching means been less productive of a succession of able men to fill the chairs than those for practical working supply.

That other nations followed early in the steps of France, by establishing veterinary colleges on her models, is a fact generally known; as are also the analogous results where the plans and their execution were equally good.

It is not my aim, however, to go into the history and merits of veterinary schools generally, but, in a cursory manner, to try and throw some light on one important division of the subject—the art of horse-shoeing—and to point out how it has progressed, or otherwise fared, by the reforms; and having now brought the inquiry down to the verge of our own time, I will next take some notice of the origin and progress of veterinary schools in England.

The Dairy and Poultry-Yard.

PRACTICAL NOTES ON WINTER DAIRYING.

Now come to the feeding of the cows, and we need scarcely say which depends upon the way in which the products are to be disposed of. If the milk is to be sold wholly off, and this is more likely to be done in the immediate neighbourhood of a town, then the feeding is different in mode and quality than when the milk is to be made into butter or cheese. So far as town or suburban dairies are concerned, it happens favourably enough that the kinds of food calculated to increase the quantity and yield of milk are easily obtained, and are obtained more easily than in the country. There is generally a large supply of water, and wash or "dreg," and of distillers' and brewers' grains, or "draff," as it is termed in the country. But it may happen, as, indeed, in the country, it is found to happen, that however inclined the farmer may be to dispose of the whole milk, or, perhaps, on the contrary, to make his milk into butter, that the peculiarities of the produce grown on his farm may compel him to adopt a mode to which we may not be inclined, or may think is the least likely to result in this difference in the feeding of different foods—or rather the results of different foods—is much more marked than is sometimes supposed. Thus the produce of one farm, or of some fields on a farm, is found better calculated to give more product than of another; as, for example, more butter will be yielded in one field than in another. Circumstances such as these will therefore determine the farmer's mode and mode of dairying he is to adopt. The mere mode of giving the food has a marked influence upon the products; thus food has a marked influence as com-

pared with the same food given raw, and so also of the way in which mixtures of food are made. Thus a distinct difference will likely be observable if, for example, meal is used in conjunction with cooked roots and chaff, the meal be given boiled at the same time, and with the roots, and when the roots and chaff are first cooked and then mixed with them in the dry or powdered condition; here, all these and other circumstances are modified, according to circumstances of locality, soil, &c., but we advert to them to point out the importance of each farmer thinking for himself, and endeavouring, as the result of that thought, to find out, by careful experiment, what is really best for him to do under the circumstances under which he is placed. We shall have other points to refer to as we proceed; meanwhile, we string together, from a variety of sources, descriptions of feeding dairy cows in winter.

It is a good plan to take up the cows as soon as the nights become cold—say the middle of October—as the white frosts which occur about that time cause them to run off their milk. They are turned out during the day till the middle of November, if the weather keep fine. From that period till May-day, they are kept entirely in the house, except being turned out a few minutes every afternoon to water. They are milked at half-past five o'clock, morning and evening. As soon as the man who feeds them comes in the morning, the dung is all removed, and each cow has a feed of 28 lb. of roots. At 7 A.M., 7 lb. of chopped hay; 9 A.M., a pail of water, with $\frac{1}{2}$ lb. of bean-meal stirred into it; 10 A.M., 2 lb. of linseed-cake; 1 P.M., 7 lb. of chopped hay; 2 P.M., turned out to water, and then 2 lb. of linseed-cake; 5 P.M., 28 lb. of roots; 8 P.M., 7 lb. of chopped hay.

On this system of management five cows produced, in seven weeks, from the 25th of March to the 10th of May, 191 rolls of butter, 24 oz. to the roll, equal to about 254 lb., 16 oz. to the lb. To this duly be

added 154 quarts of new milk, and 42 quarts of cream, consumed in the house. The milk was not regularly measured, but averaged about 60 quarts per day.

Another method is thus detailed :—

At 6½ A.M., 12 lb. of hay; 9 A.M., 15 lb. of mangolds, cut fine, and mixed with 3½ lb. of straw chaff, and 1 lb. of hay chaff; 11½ A.M., 4 lb. of rape cake; 3½ P.M., 15 lb. of mangolds, cut fine, and mixed with 3½ lb. of straw chaff, and 1 lb. of hay chaff; 5 P.M., 12 lb. of hay.

We now give brief details of other modes of feeding, the first being taken from the *Agricultural Gazette* :—

Half a cwt. of turnips, 16 lb. of hay, and 24 lb. of wheat and oat straw daily, are very large rations for a small cow—say 6 score a quarter. Cut the straw into chaff, mixing a very small quantity of hay, and pulp the roots, mixing them all together. You will then save much hay.

Of the various practical authorities who have devoted their attention to the management of dairy stock, there is none, perhaps, who has given fuller and more elaborate information than Mr Horsfall, the author of the "Prize Essay" of the Royal Agricultural Society of England. This essay, or at least parts of it, has been again and again quoted, from the thoroughly practical character of the information which they convey. A good thing cannot be too often given, or a good saying too often repeated, more especially if the good thing happens to be persistently overlooked by many, or the good saying steadily neglected—a state of matters which probably obtains to a large extent in connexion with the subject now under discussion. We therefore give a rapid *resume* of what Mr Horsfall has given on the subject of the winter management of dairy stock :—

It appeared, he remarks, an object of importance, and one which called for my particular attention, to afford an ample supply of the elements of food suited to the maintenance, and likewise to the produce of the animal, and that, if I omitted to effect this, the result would be imperfect and unsatisfactory. By the ordinary farm produce only, I would not hope to compass my purpose. Turnips are objectionable on account of their flavour, and I seek to avoid them as food for dairy purposes. I use cabbages, kohlrabi and mangold wurtzel, yet only in moderate quantities. Of meadow hay it would require,

beyond the amount necessary for the maintenance of the cow, an addition of fully 20 lb. for the supply of casein in a full yield of milk (16 quarts); 40 lb. for the supply of oil for the butter, whilst 9 lb. seem adequate for that of the phosphoric acid. You cannot, then, induce a cow to consume the quantities of hay requisite for her maintenance and for a full yield of milk of the quantity instanced. Though it is a subject of controversy whether butter is wholly derived from vegetable oil, yet the peculiar adaptation of this oil to the purpose will, I think, be admitted. I had, therefore, to seek assistance from what are usually termed artificial feeding substances, and to select such as are rich in albumen, oil, and phosphoric acid; and I was bound also to pay regard to their comparative cost, with a view to profit, which, when farming is followed as a business, is a necessary, and, in any circumstances, an agreeable accompaniment.

I now proceed to describe the means I am using to carry out the purposes which I have sought to explain. My food for milk cows, after having undergone various modifications, has for two seasons consisted of rape cake 5 lb., and bran 2 lb., for each cow, mixed with a sufficient quantity of bean straw, oat straw, and shells of oats, in equal proportions—to supply them three times a-day with as much as they will eat. The whole of the materials are moistened, and blended together; and, after being well steamed, are given to the animals in a warm state. The attendant is allowed 1 lb. to 1½ lb. per cow, according to circumstances, of bean meal, which he is charged to give to each cow in proportion to the yield of milk, those in full milk getting 2 lb. each per day, others but little; it is dry, and mixed with the steamed food on its being dealt out separately. When this is eaten up, green food is given, consisting of cabbages from October to December, kohlrabi till February, and mangold till grass time, with a view to nicety of flavour. I limit the supply of green food to 30 or 35 lb. per day for each. After each feed 4 lb. of meadow hay, or 12 lb. per day, is given to each cow. They are allowed water twice a-day to the extent they will drink.

The object Mr Horsfall had in view, was the double one of maintaining the supply of rich milk for the making of butter, and of keeping the animal in good condition. Feeders know well that in practice cows which yield milk liberally, lose condition; but by adopting a method, such as we have above quoted, the two ends may be secured. Mr Horsfall is of opinion, that the albuminous compounds of food are essential elements in the food of milk cows; and, in opposition to many authorities, shews that these constituents have a "more especial value for the production of milk than for fattening or beef making." Rape cake is admitted to be

of the best foods for dairy cows, but the feature connected with its use is, that animals dislike it, from its rank condition as compared with oil cake. But by boiling along with the other food, or by pouring boiling water over it before mixing it with other food, this rank condition is greatly id of. The following is the composition of the cake :—Water, 10.68 ; oil, 11.10 ; formers, 29.53 ; heat producers, 40.90 ; 7.79. Malt coombs, another ingredient by Mr Horsfall, is a valuable food ; it is however, easily got, and is often charged : than what it is really worth. Its composition is as follows :—Water, 3.21 ; oil, 2.96 ; formers, 23.87 ; heat producers, 45.93 ; dry fibre, 18.80 ; ash, 5.22. Beans also form material highly valued by Mr Horsfall, as ingredient in the food of dairy cows. The following is the composition :—Water, 12.85 ; 1.56 ; flesh formers, 13.80 ; heat producers 61.68 ; ash, 6.11.

Of the green foods, or rather leaf foods ; distinguishing them by this name the roots—which are used as foods for cows, cabbage is undoubtedly the best, yet, singularly enough, it is by no means extensively used as its real value might lead one to suppose might or should be the

This probably arises from the difficulty of keeping the cabbages after they are cut up, from their liability to decay and to be attacked by frost. It does not seem, however, to be generally known that the large—drum-head variety especially—is an exceedingly hardy crop, and can stand high degrees of frost exposed in the field ; and in fact, seems to have the tendency to prevent decay in the inner leaves. We leave left cabbage in the field throughout the whole winter, and that a specially severe and have used them daily with great advantage ; and have had, moreover, a supply in the early spring, which was a still greater benefit. We have only to draw to memory the

fact, that we have cabbages growing out in our gardens all the winter, and which go pretty far into the following spring, and yet keep good. We return to describe different modes of feeding. The following is given by an eminent authority :—

About three o'clock in the morning, each has a half bushel basket full of grains given to her. When the operation of milking is finished, each receives twice that quantity of turnips, and shortly afterwards one truss of the finest, softest, earliest made, and greenest meadow hay, is divided among ten cows. These various feedings are usually made before eight o'clock in the morning, when the animals are turned out into the cow-yard. Four hours after this they are again tied up in their stalls, and supplied with an allowance of grains similar to that which they received in the morning. On the conclusion of the afternoon milking (which generally continues until nearly three o'clock), they are served with a similar quantity of turnips ; and in the course of another hour, with a like allotment of hay.

The following is the mode of feeding adopted during a milking competition of Ayrshire cows :—1 bushel draff, mangold, bean meal ; 1 lb. oatmeal, 1 lb. bran, and $\frac{1}{2}$ lb. oil cake ; grass during the day, and mangold night and morning, with 3 lb. of oatmeal and 3 lb. of bean meal each. One refused to eat the meal.

Bean meal, as we have shewn, is used by Mr Horsfall in his system of feeding milch cows. Peameal is used by several dairymen, with good results. The following is a description of one method of giving it :—

Take a bushel of chaff and eight or ten sound yellow or Swedish turnips, having the tops and tails carefully taken off, and boil them together four or five hours. Add as much water as will cause the hand to move easily through the mass. Squeeze down the turnips, and add 3 lb. of peameal. Give this to a cow in the morning, and the same in the evening, with as much sweet hay as she will eat up clean, five times a-day ; and without much expense, her butter will be as rich and of as fine a flavour as can be produced in winter. Should the peculiar flavour of the turnip be detected, which is not likely, a small quantity of saltpetre, put into the cream, will remove it.

SINGULAR CASE OF POISONING THROUGH MILK.

LORD NELSON sends to our contemporary, *Land and Water*, extracts from letters from Chontales, Nicaragua, detailing one of the most singular cases of poisoning through milk that we remember to have read of. Poisoning through milk is, of course, and unfortunately, nothing new. Deleterious substances of various kinds often get into milk accidentally or otherwise, and produce symptoms of poisoning in the persons who partake of it. Like results follow sometimes through careless and uncleanly dairy-maids neglecting to wash their milk vessels properly. But the case to which Lord Nelson calls attention is altogether different, and we fancy novel. The poisoning does not come from polluted milk pails, nor from having been contaminated in any way after having been drawn off from the udder of the cow. The peculiarity and interest of the case is, that it was the cow that swallowed the poison, in this case mercury, and that after having passed through her system, it still retained all the vital properties it originally possessed. The cows had drank water out of troughs in which mercury had been washed, and the milk was impregnated with it to such a degree as to cause salivation in those who partook of it. Do any of our readers know of other cases where poison has been thus conveyed through the living organism without losing its virulence? We should be glad if they would communicate their experience to us, as the matter is of the utmost importance to all consumers of milk—in other words, to the whole community. The following are the letters referred to:—

“Under date 7th September 1869, Mr Belt writes:—‘I have been ill nearly ever since last mail. Our cows had got to a trough at the assay office in which mercury was occasionally washed. They had imbibed a quantity of mercury, and the milk contained it. I am fond of milk, and when I took ill the doctor ordered me as much as I could take. It culminated in severe salivation. As soon as we found out the

cause, and stopped the supplies of the poison, I commenced to amend, and now, although still very weak, I am rapidly recovering, and am quite able to go about my usual duties.’”

“Under date 7th September 1869, Dr Simpson writes:—‘I regret to report that Mr Belt has suffered from a severe attack of mercurial poisoning, but is now much better, although he has still to recover from the debility consequent on such an illness. He had not been well for some weeks, but became worse on the 16th ultimo, and two days afterwards was profusely salivated. He had taken no preparation of mercury medicinally, nor had he been exposed to its action in any way, as far as could be ascertained, so that it was difficult to explain in what manner it had entered his system. An examination of the cooking utensils only yielded negative results. At last it was suggested that it might be present in the milk, and this turned out to be the explanation of the problem. The cows that supplied Mr Belt's house with milk had been in the habit of drinking daily out of two troughs used in retorting, both of which contained considerable quantities of quicksilver, both pure and soda mixed. The cows were out of condition, had not given much milk of late, and when examined their gums were found swollen. An analysis of their milk set any doubts that might have remained at rest, as distinct traces of mercury were obtained by several tests. Mr Belt had at all times drank freely of the milk, and unfortunately after first feeling unwell it had been his principal article of diet. The youngest child, the other chief consumer, was likewise afflicted, but in a much less degree.’”

“Under date, 6th October, Mr Belt writes:—‘We are all now in capital health. I have quite recovered from the mercury poison. One of the cows, and the calf of the other, died from the effects of it. I believe I had rather a narrow escape myself.’”

The Country Gentlewoman.

OUR MODERN DOMESTIC SERVANTS.

TAKE the common outcry about domestic servants—about their love of finery, their constant desire for change, the increase of wages, and the decrease of attachment to their employers. There is considerable foundation, in fact, for such complaints. It is disagreeable, and sometimes inconvenient, to find them copying the style of dress of their superiors so exactly, that the lady's-maid, if she has a good figure, sometimes looks more of a lady than her mistress. Your kitchen-maid is writing up her correspondence when she ought to be washing her dishes; and your footman, just when he has got used to your ways, and you have made him into an excellent servant by dint of much painstaking and forbearance, gives you notice some fine morning—having “no fault to find,” as he is generous enough to inform you, but because he thinks “he should like a change.” All this is very provoking; very unlike the good old times, very different, perhaps, from what you remember yourself in your father's household, and a sad contrast with the grey-haired retainers of your grandfathers and grandmothers. Where are all the good old-fashioned servants gone? we ask of one another querulously. The answer is exceedingly easy, though it does not seem to occur readily under the pressure of household difficulties. They are all “gone where the good niggers go”—white or black, we may charitably suppose—and where the old masters and mistresses are gone too. If our own tastes and habits of life were the same as those of fifty years ago, we should find servants much the same as they were then. It is unreasonable to suppose that all the lower strata of

society are to stand still while we move forwards; yet there is no more common mistake. We must accept, if we are wise, all the aspects of an age of progress, without expecting that they should all chime in with our own personal tastes and conveniences; content to reap the unquestionable gains, and to put up with the inevitable losses. Remember how often you have blessed Rowland Hill and the penny postage, before you break out into any desperate language because the postman has brought three letters in one morning for the cook. You are shocked to find that your nursery-maid has left a novel by accident in the baby's perambulator; but who was it that subscribed so liberally to the National School at Duckpuddle, and even took the chair one evening at the penny readings in that ambitious village? There were no such things, you will please to remember, in the good old times of your grandfather. But, you may make answer, you think it quite right that every man and woman in a Christian country should learn to read their Bibles—that is your notion of education for the masses. It is well understood, of course, that you confine your own literary studies entirely to the Book in question, taking a turn at the “Whole Duty of Man” occasionally, by way of relaxation for lighter hours; but it would be too much to expect that all the world should follow such a meritorious example. But the novel was trash, or worse than trash—a sort of book to put very undesirable notions into the head of a servant-girl. Of course you exercise a rigid censorship yourself over the box from Mudie; tales by the author of “Guy Livingston” and “Cometh up as a Flower” have long been

placed in your *index expurgatorius*—and you never went to see “Formosa” at Drury Lane. But other heads of families are not so careful, and the nurse-maid, you see, had not the advantage of your advice in her reading. It is very ridiculous, indeed, that John should have come to look upon a fortnight’s holiday every year (to see his friends, forsooth!) almost as a right; and that James, after five years’ service, should talk about “wanting a change.” *You* enjoy your holiday—but then you are a county magistrate, and work a good deal harder than John, and get no wages. Your daughters were moped to death last year, and you feel yourself you hardly did your duty by them, because they only got that poor three weeks at Brighton instead of a run on the Continent.—*Maga.*

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FEBRUARY 1870

AGRICULTURAL HOUSES AND CHILDREN AFIELD.

E have read, with considerable interest, the Reports by the Parliamentary Commissioners appointed to inquire into the cottages occupied by what is denominated the "agricultural poor." As our countrymen are well aware, we have taken a great deal of trouble in this matter itself, some years since, at the expense of sending a Commissioner into the condition of the houses and cottages for agricultural labourers in England—a duty which the Government Commissioners have not yet been able to over-look, though they intend doing so. And, in consequence of our own experience, alike in England and Scotland, we must demur to the designation of "agricultural poor." Why poor? Few labouring men who are better paid than they are at year-end to year-end, who are engaged in agricultural labour. A mason cannot work in frost; a bricklayer and a slater are at the same disadvantage as numerous other workmen feel the illness or depression of business. Farmers, as a rule, do not experience that want of money, "that eternal want of pence," which the Laureate expresses it, "which cripples the men." Wet days and dry days are alike fatal to them. They have no "broken time" as it is called. Their wages—we are well aware of ploughmen—go on constantly, and makes no difference in the half-yearly payment. It is true, that in some counties,

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notably in Dorsetshire, the wages are small—too small in fact to support a man and his family, unless that what the husband earns is supplemented by the labour of his children; and these he must often have to send into the fields at a very tender age. He cannot afford to give them education; he cannot even keep them, although he had no school fees to pay. Instead of laying anything out upon them, however willing in his heart he might be to do so, necessity compels him to send them a-field (as soon as their poor little throats are able to squeak out sounds that will frighten predatory birds, or their little hands able to grasp a hoe), in order to bring in something for him and themselves. And yet, although this does happen to be the truth in certain counties—and a lamentable truth it is—yet the fact appears much worse on the surface than it is in reality. The wages, of course, look small in comparison with those earned in towns. But then, as we have already stated, there is no lost time. Rents are much cheaper, where rents are charged at all; and there are many perquisites, in the way of living, among agricultural workers, which those in the town know nothing about. Again, the labour of children employed in agriculture is not nearly so severe as in factories or in mines. In fact, town children would consider the labour of these little Hodges perfect fun, especially the crow scaring. Jack or Bill, with

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a rattle in his hand, and screaming at the top of his voice, scampers over the potato fields in the highest of glee, the fresh air and exercise imparting a ruddy and healthy glow to his round cheeks, and vigour to his limbs. He is no more like the emaciated child in the cotton factory, or the stooping little blackamore in the mine, than "chalk is like cheese;" and, in fact, it would be greatly to the advantage of many town children in good positions, could they have the privilege, perhaps we should rather have said the *necessity*, of running about with these same little Hodges or Sandies.

And the Report from the Commissioners thoroughly confirms our own statement, and our own experience, that field work is not injurious to children. A contemporary, *Bell's Messenger*, summarises the Report of the Commissioners in a very fair way, and *Bell* says, "both the Commissioners agree that no legislative interference is required on the ground of the work of the children being physically injurious to them, and the *medical testimony is strong upon this point.*" The italics are our own.

Dorsetshire is the bugbear, if we may so call it, of agriculture. In all Parliamentary inquiries, as may have been seen from our pages some time ago, and which is now reported by the Commissioners, it was the "black sheep" among all the counties; and those who farm there—and there are many good occupiers of land in the shire—should see to it that like reports have no justification again. It will not do for them to sit down supinely and take consolation to themselves on the ground, as Longfellow puts it in one of his poems,

"There is no flock, however well attended,
But one black sheep is there;
There is no household howsoever defended,
But shews its vacant chair."

What is wanted is neither a black sheep nor a vacant chair. Dorset can, if it chooses, have sheep that are *not* black, and we should like to see its place vacant by obliteration from the map of England.

Why should it be the shabbiest shire in the

kingdom? The one by which all agriculturists, and others who speak about farm take leave to

"Point a moral and adorn a tale."

Dorset should answer.

But to return to the agricultural poor recapitulate, in the briefest way, some data about them first, in the principal counties of Scotland. In East Lothian, acknowledged one of the finest farmed counties in the world, the wages for ploughmen from £30 to £40 a-year. The house accommodation on some estates is certainly not all that it ought to be; on others, it is to be even better than is required; and almost all improvements have been made within recent years. In Fifeshire, the ploughmen's wages range from £35 to £37; even higher. In Forfarshire, from £38 to £41 are given yearly; and in Aberdeen somewhere about the like sums, although there is very considerable variation in the mode of housing the people. In Ross-shire the wages range from £25 to £30; and in a number of counties the condition of the permanent agricultural labourers may be set down as having improved in Scotland at least 25 per cent. within recent years, and the wages in the same ratio. Other workmen advanced so successfully at the same time?

Of course, we at once admit that there is still much improvement needed in the cottage accommodation in many quarters, but we cannot, looking at all the circumstances, see that labourers in agriculture are to be pitied, or rather we should say more, or indeed so much, than as agricultural workers in towns.

In England, according to Parliamentary returns, wages vary from 8s. to 18s. a week, or from £20 to £45 per annum, the sum, however, being very exceptional. Over the whole counties they would average about 12s. or 13s. per week, or £34 a-year. Of course, there are, besides Dorset, one or two other counties where the sum is not realised, and there are many

the house accommodation is far from what ought to be. Still, there are no huts in any part of the rural districts that we have visited so bad as the dens we have inspected in towns; and no children in the country so malnourished, or more ignorant, except in that

knowledge which only tendeth to evil, than City Arabs.

About the educational question, with regard to children employed in agriculture, we shall take another opportunity of speaking.

EDUCATION OF AGRICULTURAL CHILDREN.

THE discussion of the subject of National Education, along with that of the Irish Land Question, will, in all probability, occupy the greater portion of the coming session of Parliament. And both questions are so important that no person who desires the general good of his country—the greatest happiness and comfort of the greatest number—will grumble if they should be considered even to the exclusion of all minor topics. Although Ireland is, indeed, as it has been often described by us, *the* question of the day, and will of course therefore receive the greatest attention—it is so only because there are elements of disaffection and danger in it, which, if not allayed and averted, will result in overt acts that will be next to ruinous to this kingdom. But national education, if not compelling such urgent attention from the Legislature, is intrinsically really more important than the redressing of the wrongs, as they are called, of Ireland. Were the people in the Emerald Isle thoroughly educated, such wrongs as exist would be more easily and speedily set to rights; and were a good system of education devised for our own country, many of the heart-burnings which exist in class against class would be effectually cured. Education is a noiseless, but a much more successful leveller than the Charter, which succeeded only in levelling some of its supporters down to the condition of brutes. Education, on the contrary, “levels up,” it does not bring the gentleman (we use the word in its wide and rue sense) down to the state of the boor, but it robs the latter of his boorishness, gives him,

instead, the manners and bearing of a gentleman, and even enables him, with industry and perseverance, to raise himself up to a like social position. A good education is the greatest blessing which can be conferred upon any country, and how this is to be satisfactorily bestowed upon our own is the problem which our statesmen must solve. No doubt the matter is surrounded with difficulties of no common order. Keen religious and party-political feelings are mixed up with it; selfishness on the part of those who think that their rates will be enhanced by the adoption of a national system, and, above all, ignorance in those whom it is desired most to benefit. But we are hopeful that all these will be completely overcome, or at all events that an agreeable compromise may be effected; for it is certain that if this educational Gordian knot be not unloosed, it must, before a far distant day, be cut.

So much on the general question of education. We now, according to a promise made in the preceding article, while discussing the social condition of agricultural labourers, come to notice the education of agricultural children. As one of the sections of any general Act about education that may be adopted, this is likely to prove one of the most difficult to deal with. Even the two Commissioners appointed to inquire into the subject, Mr Tremenhare and Mr Tufnell, have differed so far in their conclusions in the matter, as to render it necessary that they should issue two separate reports. The condition of agricultural children, and the nature of their labours, are very different from that of children in towns—of

those employed in factories. In the latter, the work is of such an arduous and unhealthy character that the Legislature has interfered to prevent children under eight years of age from being employed in it; and it may be doubted, judging from the appearance of many young people as they emerge from these great productive marts, whether even the minimum age at which they enter should not be increased a year. Children in agricultural districts are employed in field work as early as six (the scanty means or improvidence of their parents sometimes compelling this), yet are they ruddy of countenance, and generally healthy. And in these facts lie the difficulty in connexion with their education. Factory children have two years longer in which to be educated before they commence labour; and, what is more important still, they can, without the slightest inconvenience, be taught, under the half-time system, after they have begun to work. They are thus gaining knowledge at the same time that they are earning money towards their support. Now, in the case of agricultural children, as already indicated, under present circumstances, stern necessity often compels them to go into harness at this early age; and the Legislature cannot well interpose on the ground that the labour is unhealthy. They lose, to begin with, two years in comparison with town children; but the worst of it is, that it is quite impracticable to adopt the half-time system in husbandry. At certain seasons of the year, when child-labour is required, the farmer must have his work accomplished as soon as possible. He is dependent upon the weather, and a suspension of labour like that the half-time system imposes, would be ruinous to him. What, then, is to be done in regard to the education of these little workers-a-field, because something must be done for them as well as for others?

We have already stated that the Commissioners, Mr Tremenhoe and Mr Tuffnell, offer in opinion as to the means to be adopted for the improvement of education in the agricultural districts. Mr Tremenhoe does not deem it necessary to advocate legislative

interference with regard to the age below which children should not be permitted to engage in agriculture, as he is of opinion that the good feeling of employers can be relied upon for suiting the work to the strength of the child; while Mr Tuffnell believes that no scheme for the education of children will be efficient that does not fix a minimum of working age, and while thinking this should be ten, he would, seeing the Factory Act at present fixes it at eight, compromise for nine, which should be the minimum age for children to engage in all pursuits. He agrees that the half-time system in agriculture is impossible, has little faith in educational certificates, as a clever boy, under their operation, might be admitted to labour before he was physically capable, while a stupid boy might have to remain longer than necessary, and urges an improvement in schools generally, of the present condition of which he draws anything but a pleasing picture. Mr Tremenhoe's educational suggestions appear to us to be very sensible. What he wishes is, to couple education with labour, making it obligatory that a portion of the child's earnings in the fields should be devoted to his tuition, and as the half-time system is impracticable, his proposals in effect are these:—"That every child employed in field labour for as many as seventy-two week-days (twelve weeks) in a twelve-month should be required to complete 160 school attendances, that is, about 400 hours, or 80 days in the year, until the age of twelve; but at times of the year, when the child is free from work, the obligation to be reduced to 60 attendances for a child of nine years who passes an examination in the fourth standard, and to cease altogether for a child of eleven who passes the fifth standard examination. This implies an amount of elementary instruction in reading, writing, and arithmetic, which may be looked to with some confidence as enabling and encouraging the process of after instruction to be carried on by voluntary effort." We commend these views of Mr Tremenhoe as being at once the most practical and feasible we have yet seen.

THE IRISH LAND DIFFICULTY—LARGE AND SMALL FARMERS.

WE have purposely refrained from resuming our remarks upon this subject till now, that we might allow time to develop some of its phases, and to see whereunto and to what length the agitation connected with it would go. We confess that, at the period when last we discussed it, we had no great hopes, if indeed any, that time, which in other matters so often brings with it healing on its wings, softens down wrath, and makes difficulties plain, would so act in this case. We feared rather—and the fear, we regret to say, has been justified—that the elements at work, being of anything but a healthy character, would increase in virulence, and that, like cumulative poisons in the human system, would ultimately demand a cure other than that thought of at one time, either by patient or physician. And that cure must be yet undergone, if fairness and reason are to be substituted for the wrong and the absurdity with which the claims of many of the Irish, as regards the land, have been promulgated and advocated. For the position now taken is so manifestly a wrong one, and goes so thoroughly to the root of all rights in property, that it is obvious, if these rights are to be henceforth maintained throughout the kingdom, the time must come speedily—ought, at all events, to be brought forward speedily—when the Irish claims must be met with a positive and decided refusal. We are not now referring to what all are agreed upon as the just claims of Irish tenants—to these the best attention of the Legislature will be given, with a hearty desire to meet all the necessities of the case—but we refer specially to that class of claims which include what is now so widely known as “fixity of tenure at a fair rent.” Without at present stopping to inquire here what will be considered on both sides—for there must surely be two parties to the bargain—to be a fair rent, we go on to examine what would be

the effect of fixity of tenure in an agricultural point of view. From the point of view connected with property as property, and in the rights of which all are interested, we have already shewn that this claim is eminently unfair, and therefore thoroughly unsound. But, as said above, it is with the agricultural aspects of the question with which at present we purpose to concern ourselves. In a previous article we stated our belief to be, that the fixity of tenure principle, if adopted in Ireland, would manifestly tend to the perpetuation of the worst features of Irish farming in small holdings; and these features, all who know anything of the subject know that they are bad enough—bad almost as they can possibly be. And this brings us at once to the question of “small holdings,” or “la petite culture,” as our Continental neighbours call it.

We have heard—and from those high in practical authority—the praises sounded very loudly of this system. Are we saying a wrong thing when we say that these praises have been founded upon an entire misconception of what this system is, and of the agricultural consequences which would result from its adoption in this country? A great deal has been written and said as to the evils arising from the absorption of small farms into large ones. The tendency in this direction has of late been very marked, and it is, we venture to say, a natural tendency, and one which carries with it the best interests of the community. We assert, with all confidence, that the large farm system is that which has brought about that remarkable development of agricultural progress, both in its theoretical and practical features, which has characterised the farming history of the last decade or two. It is not in the nature of things that the holders of very small farms can bring to bear upon their cultivation all the resources of science. Capital, as a

rule, they have none, and without capital no great improvements can be made. Living, so to say, from hand to mouth, the struggle is perpetual, merely to keep things going, so that no reserve or saved money can be accumulated to meet unfortunate circumstances. There are some remarkable exceptions to this rule, where we see a high degree of skill brought to bear upon the cultivation of the soil, which results in fine crops; but these are quite exceptions, and the rule in this country assuredly is, that small holdings are in the hands of those who make remarkably little progress in social advance, and do as little to set forward the progress of agricultural science and practice. Where advance has been made in this direction, it has always been made by those holding large properties, or cultivating large farms. It is for them, and them alone, that our agricultural chemists study the theory, and apply it to the practice, of agriculture. It is for them that the large factories of the Ransomes, the Howards, and the Garretts, send out the hosts of mechanical appliances; and it is for them, moreover, that the special helps of artificial foods and manures are brought out. All this wide array of scientific talent and mechanical skill would have had no existence but for the large farmers; they have not been, and are not now, supported by the small holders, who do not, indeed, require some of these helps, and if they did, have not the means nor the desire to get them. We say, have not the desire, for all the popular jokes as to the slowness and stolidity—a much harsher word much resembling in sound the latter, is not seldom used—of farmers, have their origin in connexion with the class of small holders. It is they who, as a rule, hold fast by the old things, walk in the old ways, and sneer at what they call the new-fangled notions of the present day. They laugh also at “book farming,” as they call it—never read a work on agriculture, nor subscribe to an agricultural newspaper, and are consequently in entire ignorance, except from hearsay, of all the modern modes and appliances of agriculture

which science and practice are day by day developing for their advantage.

The large farmers do not in any way deserve the censure of those who blame them for slowness and indifference to scientific progress. They are not thus indifferent; on the contrary, we claim for them, with all confidence, this proud position—that, as a class, they have been quicker to avail themselves of all the aids which science offers than any other class in the kingdom. We refer, in proof of this, to the really marvellous rapidity with which agricultural science has spread during the last twenty or thirty years. In place of being behind the time, and slow to avail themselves of science, the large farmers have in many instances forestalled the man of science, and have rather urged him on to greater efforts, than being themselves in the position of those who had to be urged to avail themselves of what the man of science brought out. If time and space permitted we could give abundance of particular proof to shew that it is almost, if not altogether, entirely to the large farm system that all the advance of agricultural science is due. Progress would have been wretchedly slow, if indeed there would have been any progress at all, if the small farm system had been universal in this country. But we are told by those who advocate the system that we are not to look *here* for examples of the good it does; that we must go *abroad* to see what it can do, and has done, to make a body of independent and well-to-do tillers of the soil. It is easy for us to accept the challenge, for when we do go, and make an honest report of what we there find out, we shall have this as a result, that our case against small holdings as not being adapted to this country, is made all the stronger.

The evidence we are told to look for on the Continent, as evidence in favour of the small farm system, *we find to be evidence dead against it*. We know that this is not the popular view, but we know also that it is the correct one, as we hope to shew in a forthcoming article.

A PROPOSAL TO ABOLISH THE GAME-LAWS.

THE Game-laws have long been a fertile source of vituperation, so much so, that, alike in England and Scotland, the Game-law has been elevated into a kind of hero. Staid sober farmers, grave and senators, clergymen, and citizens of all ranks, have chorused in a wild whoop for the abolition of the Game-laws. Indeed, perfectly sane on other questions, appear, as Festus deemed the Apostle, mad, from too much learning, but surely sane on the matter. The mention of Game-laws has much the same effect upon them as a red rag upon a bull. They attack them as furiously as the animal upon a red cloth, but often their attacks are without precision. Supposing, for a moment, that the Game-laws were abolished (and that they might with advantage, under the circumstances presently to be mentioned), what would the tenants derive? Very little, without a special Act to prevent land-lord-bargains with their tenants in respect of preserving game, and such an Act is likely to be passed. The landlord will guard himself, if he prefers to hold the land by inserting a clause in his lease to that effect, in high condition, if the tenant agrees to, and to respect. The game would be a matter of bargain between landlord and tenant, *as it is at present*, to be little affected by sweeping away the various statutes which constitute the Game-laws. But what of the Game-laws, about which so much noise is made? There seems a great deal of misunderstanding about them. So far as we can see, they simply amount to this, that certain animals are defined as game by the law, so that these cannot be killed by any proprietor or tenant, as well as any other who does not take out a game license, and that this game, if no stipulation

be made to the contrary in the lease, belongs, in England, to the occupier, and not to the owner, of the soil; and in Scotland, if no definite statement be made in the contract, to the landlord, and not the tenant, has the right to kill the game. The Game-laws also limit the killing of winged game to certain seasons of the year. This, we believe, is all that is in them. Now, as we have said above, their abolition (with the exception of still maintaining a close time, as in the salmon fisheries), would not much alter the state of things.

But could not Mr Lowe, who has shewn himself a clever financier, give effect to some such proposal as this, viz., abolish the game licenses entirely, and impose a tax upon every gun, say 10s. This would bring, we are certain, a vast deal more revenue into the funds of the Exchequer. In 1869, the amount received from game licenses was only £163,874; and a change of the nature we have referred to would, as in the reduction of the tax on dogs (although not now so pestered with curs on the street), readily triple or quadruple that. Then, again, it might help to allay the feeling that prevails with regard to the heavy license being intended to be prohibitory upon all but the wealthy sportsman, although the poor man may enjoy the pleasures of the gun as much as the rich. It might also help to diminish poachers, as no one would then be entitled to the possession of a gun save those who had duly taken out a license. Of course, this would make no alteration in the rights of property, no one being allowed to shoot over ground where the privilege of doing so had not been granted by the rightful owner. We throw out these remarks merely in the way of suggestion, and shall be glad to have the opinions of our readers about them.

PROBABLE CHARACTER OF THE WEATHER IN 1870.

THE Rev. R. Tyas has recently published a little book called "The Barometer and How to Use it," in which he ventures on some predictions as to the probable weather of the year 1870. That our readers may determine for themselves whether weather prophets are to be depended on or not, we may state that in his prediction, or prognostication, of the probable weather of the year upon which we have entered, the rev. gentleman says, that in the first week of January there will be "keen frost if wind not S. or S.W.," which we take to mean frost if the wind do not happen to be in the south or south-west. Now, this way of stating the matter appears to us to be very conveniently vague. The author must be aware that the wind takes a different direction in different localities. For instance, we noticed in a paper which we saw within the last two or three days, that the wind in Portsmouth was S.W. and dull, and the same in Brighton; that in London it was S.S.W. and fine; in Yarmouth the same; in Hull, S. and fine; in West Hartlepool, S. and dull; Shields, S.W. and fog; Edinburgh, S.W. and cloudy; Dundee, W. and dull; Aberdeen, N.W. fine; Plymouth, S.W. gloomy; Penzance, S.W., fine; Cardiff, S.S.W., cloudy; Swansea, S.W., dull; Holyhead, S.W., rain; Milford Haven, S.S.W., squally; Liverpool, S.E., cloudy; Whitehaven, E., rain; Dublin, S.W., dull. Now, here we have a great difference in the points of the compass, and no less change in the character of the weather. In fact, this summary of the weather in the first week of January appears to us to be of little more value than the hieroglyphics in "Zadkiel," and explainable to the satisfaction of the author in much the same way; inasmuch as he can take his wind and his weather from any of the various quarters that agrees with his theory best. But in

order that our readers may have a means of comparison of the Rev. Mr Tyas's predictions with the actual weather, we give his prophecies as he states them, leaving out, of course, the first week of 1870, as that has already been mentioned.

Well, then, according to this clerical authority, there was to be in the second week of January snow or rain if wind S. or S.W.; in the third, the weather was to be mild and fair; and in the fourth, cold, with high winds. In February this year (not being that one in which ladies can, without impropriety, "propose" to the gentlemen, and, if unaccepted, claim a silk dress), containing, as the old arithmetic books tell us, of days "only eight and a score," the first week is to be mild and fair; the second snow or rain, if the wind is in S. or S.W.; frosty and fair, if N. or N.E. In the third we are to have the weather snowy and stormy; and snow or rain in the fourth, if wind S. or S.W.; frosty and fair if N. or N.E. For the first nine days in March it is predicted that we shall, with a south wind, have snow; and cold showers should the weathercock shew the wind in the west. Rain and snow are to follow each other in the next two weeks of this month; and "stormy with snow" is the *dictum* about the last one. The first week of April is to be fair, the second rainy, and the other two fair. May is not to be such a charming month as one usually expects it to be. In fact, according to our prophet, it is to be one of the kind of which the poet sings,

"Winter, lingering, chilled the lap of May."

The first week, should the wind be S. or S.W., we are to expect rain; if N.W., fair weather. We are told that it will be changeable in the second week, and wind and rain on the third and fourth! June opens changeable; in the second week it is stated

we are to have fair weather; in the first week it is prophesied that it is to be very dry; and the fourth, rainy, if the wind is from the S.W.; fair, if N.W.

About July the report is, it shall open fair; in the second week, rain; in the third, fair weather; and in the remainder of the month, changeableness, with frequent showers. For

the first three weeks of August frequent showers, with changeableness, and wind and rain are reported; and in the last there is to be rain if the wind should be from the S. or S.W.; fair, should it blow from the N.W. or N.E.; "very rainy" harbingers September; for the

first two weeks the prophet declares it fair; in the third, wind and rain is his prognostication about the fourth week. In the first week of October,

rain is promised if the wind is S. or S.W.; fair, should it chance to be in the N.W., or N.E.; in the second week; rain is predicted in the third, rain or fairness, according as the wind blows, from the S. or S.W. or

from the N. or N.E.; and the last part of the month is to be mild and fair. November, we are informed, opens with rain or cold, if the wind is W., with perhaps snow, should it be in the E. In the second week there is to be stormy weather; in the third, cold rain with a west wind, or snow with an east; and in the fourth, hard frost should the wind blow from any other quarter than the S. or S.W. About the last month of all in the year—"which ends this strange eventful prophecy"—it is assumed that we shall have it frosty and fair for the first eight days; stormy and snow in the succeeding week; snow or rain should wind be S. or S.W., frosty and fair if N. or N.E.; rain and snow in the fourth week, and fair in the last two days of "the bleak December." Any person having a diary can determine for himself whether Mr Tyas, as a weather prophet, is worthy of honour in his own country.

Farm Architecture.

THE SANITARY ARRANGEMENT AND CONSTRUCTION OF BUILDINGS, DRAINAGE, &c.

IN continuation of our previous papers, we have to remark that the points requiring to be attended to in carrying out the conditions mentioned under the *second* head are, good "shape," proportionate "size," and efficient "laying" down of the drains. As regards the "shape," it is now conceded that the circular form is the best to be given to drains. The square drain, with flat bottom and vertical sides, is the very worst that can be adopted. We cannot conceive of any one having an acquaintance with the principles of hydraulics adopting this form for a conduit, the office of which is the quick conveyance of liquid. As the friction depends upon the surface with which the water flows in contact, it is reduced in proportion to the reduction in amount of this contact. It is desirable, therefore, that water flow through a tube most rapidly where the proportion of the surface is small when compared with that of the quantity of water flowing through it. This desideratum is obtained by the use of the circular tube. The velocity of any body of water flowing through a channel is increased by decreasing the surface over which it flows, and *vice versa*. Hence the necessity that exists for increasing the velocity of sewage matter—which has in itself a tendency to flow sluggishly—by as correctly as possible proportioning the size of channel to the quantity of water it has to convey. With reference to the proportional increase of the flow of sewage water in flat-bottomed rectangular drains, when compared with those having a semi-circular form, Mr. Roe states that, "With the same flow of water the difference in construction occasions a difference of more than one-half in the deposit which is left. Nor let it be supposed

that it is not necessary to pay as much attention to the shape of house drains as may concede is necessary for street sewers. On the contrary, the greater necessity for the former being attended to than the latter. In the case of street or large drains there is generally a large accumulation of liquid, and the cleansing or flushing produced by heavy showers of rain are now and then obtained, thus rendering slight irregularities of shape or form of no great consequence. With "house drains," although short, a large quantity of fluid sent down them is of comparatively small amount, and only passes at intervals; the flow of water being small, the greater the necessity for keeping it in motion to enable it to carry away the deposit." In addition to the circular tube, the "egg-shaped" is also to be recommended. In this shape the small end is placed lower. As the egg-shaped tube increases in diameter upwards, it presents the great advantage of confining the fluid into a small space, thus there is little passed into the drain, thus insuring the utmost efficiency in removing deposits, &c.; and when the quantity of liquid increased the space is increased. With reference to the materials used for drains in small houses, there is no doubt that earthenware, in all its varieties, is admirably fitted for the purpose—"they possess the three requisites of cheapness, durability, and impermeability." Earthenware drain tubes of various kinds and qualities, "unglazed stoneware," "glazed," "vitrified," "glazed," "glass lined," and "terro-metallique." The sizes range from 3 to 15 inches diameter, and the price per foot from 5s. to 5½d.

In determining the size of the drain,

should be paid to the quantity of water liquid it will have to convey. This can

be done efficiently by giving it a proper ratio to the roofage ; and the size of tubes through which water is conveyed to house from which the drain is led." For ordinary cottages, from two to four persons, a drain tube of 4 inches diameter will be ample dimensions ; for six or eight persons, a 5 inches diameter ; and for other houses a 6 inches diameter will be sufficient. As there is danger to be apprehended in making the tubes too small, the minimum size should be 3 inches, for the smallest cottage. We may here point out one cause why drains are often made very large. Thus, suppose a 6-inch tube is used to drain a certain house, or to convey sewage liquid created by a certain number of individuals, where a house of double size, or containing twice as many inhabitants is required to be drained, the conclusion is often arrived at, that a drain tube of double the size, or 12 inches diameter, will be necessary. This arises from an ignorance of the simple rules for ascertaining the increase of hollow bodies in proportion as their dimensions increase. Thus, in the case above supposed, the cubical contents of the 12-inch tube will not be twice that of the 6-inch, as it is supposed, but four times, although it is twice the diameter. Just as in a square of wood 2 inches in the side, the superficies is 4 square inches, while in a piece 4 inches in the side, the superficies is not 8 square inches.

In laying down the drains, there are several points to be attended to. In the first place, throughout their length, the drains should have a considerable fall, or inclination. This will be efficient if 1 in 70—that is, for every foot of horizontal direction there should be 1 inch of 1 foot of perpendicular. This, however, should be the minimum fall, and the locality will admit, a much quicker fall should be given. It is not easy to give too much fall to the drain. In changing the direction of the drains, all angular bends should be avoided, and easy curves substituted ; the longer the sweep of these curved

portions the better. Where one drain-tube joins another, conveying liquid to the principal drain from a side source, the junction should be effected by a "circular junction," never at right angles. As it is essential that drains should be impermeable, that is, be so constructed as not to allow of the liquid sent through them to gain access to the surrounding soil, great care should be taken to have the joints at the various lengths of tubes most efficiently made. A jointing of well-worked clay is found to be as efficient as any other material, even as good as hydraulic cement. The importance of attending to this point will be seen on considering that, if the joints are not "made good," the liquid portion of the sewage will pass through the apertures left, and leave the solid portion in the interior of the drain, and thus tend speedily to choke them up. The "bedding" of the drains is also of importance, so as to enable the same level to be retained at which they are originally laid. To effect this, it is a good plan to place each length of tube in a bed of well puddled clay. We may here remind our readers who may have occasion to require drains to be laid down, of the importance of seeing that the workmen employed do not "scamp." "All underground work is apt to be carelessly and badly done, for the defects, however serious, are buried with the materials." The efficiency of one drain or set of drains may be considered by a house proprietor as a very small matter ; nevertheless, it should be remembered that it is but a repetition of those failures or instances of neglect which create so much disease amongst us. The laying down and the repairing of drains is very much facilitated by the new forms of added tubes, and the mode of setting them on chairs or saddles. In the third department of conditions of a good drainage system, is a mode of preventing the access of the foul air of the drains from passing from their interior into the house, or the neighbourhood of the house, with which they are connected. This is generally done by the adoption of "traps" to all the inlets and outlets of the drains. A

"stench trap," as it is commonly called, is a contrivance in which the exit aperture, or that leading to the drain, is always at such a level, that a portion of the liquid passed down the trap—as, say from the kitchen or scullery sink—remains to cover that part round which the foul air from the drain attempts to pass into the house, or through the upper aperture of the trap. By this arrangement, the poisonous gases from the interior of the drain are prevented from passing through the trap, so long as it is completely filled with water. The inlets to the drain from the sink or slopstone in the scullery or kitchen, the wash-house and the water-closet, as well as the outlet to the liquid manure tank, should all be carefully trapped.

The ventilation of drains has only been properly mooted within the last few years. Important as the subject is, it has, however, met with a degree of indifference by many, if not with open ridicule, as being a refinement in sanitation somewhat uncalled for. If it were possible in all house drainage so to regulate the supply of water to the tubes, that the drainage matter could at once be removed to the main drain; and, moreover, if the removal of the fluids could as speedily be effected from the latter to the place of ultimate disposal, at the liquid manure tank, then the ventilation of drains would be unnecessary, inasmuch as the matter apt to be decomposed in the interior of the drains, would be removed before evolving deleterious effluvia. Again, on the supposition that the supply of water was not so efficient as, in all well regulated drainage, it ought to be—if the outlets to all drains were properly trapped—and (which is very important) if these traps could be guaranteed as to their efficiency, by being carefully looked after and cleaned out from time to time;—then, the gases would find it difficult to escape from the drains, special ventilation might be dispensed with. But, as unfortunately in all cases where the preservation of health is concerned, carelessness and indifference are apt to be engendered, it is very unlikely that all the preventive measures of modern house-drainage will be attended to and enforced,

we consider it the most reasonable method to provide means at once efficient, and out of the reach of all domestic interference and control, by which the gases evolved from matter deposited in the drain can be immediately withdrawn, and made to mix with the external atmosphere, at a considerable distance from the zone of respiration. This desideratum is at once attained by making a separate ventilating flue in the walls of the house to be drained; this flue carried up and terminated at the roof. If the flue could be carried up along with the chimney, so that one side of it would be formed by the side of the chimney flue, the ascent of the gases would be considerably accelerated by the heat derived from the chimney, at those times in which there was a fire in the grate connected with it. It will be essentially requisite that the connexion between the drain and the ventilating flue should be air-tight.

On the subject of drainage we have only one point to enlarge on, and that is, the place of ultimate deposit, to which the matter is to be taken. There are two *termini* available in improved house drainage; these are the main sewer and the "liquid manure tank." In nearly all suburban districts, and in a great majority of intramural ones, unfortunately, the former is not at all available, from the simple reason that there is none provided; it is only so in such cases where a perfect and efficient system of street sewerage has been carried out. In rural districts the obvious thing to do is to take advantage of the liquid manure tank. It is scarcely necessary, we hope, to say that all systems of house drainage are thoroughly defective in which the open cesspool is employed. On this point, one of our best authorities on drainage (Mr Dempsey) says:—"The great importance, however, of avoiding all sources of unwholesome and offensive effluvia, and of preserving the foundations of buildings, and the substrata of the soil, in a dry and clean condition, creates a severe necessity for relinquishing cesspools, and receptacles for sewerage within, or con-

ected with all buildings and places whatsoever, except those to which it is conducted for the purposes of collection and treatment. The sole purpose of all house apparatus of water-closets, sinks, and drains . . . should be that of affording a passage for the conveyance of the refuse water, and other matters reduced. This conveyance should be immediate—every particle committed to the entire ramification of passage being preserved in a ceaseless motion until it arrives at the final collecting place.” With reference to the deleterious influence of cesspools in the close neighbourhood of houses, it is easy to perceive, that however well ventilated the apartments may be, such arrangements are rendered perfectly futile from the admission of air tainted by the admixture of gases emanating from the filthy accumulations of the cesspools. Mr Toynbee, a gentleman who has paid much attention to ventilation, holds this view of the matter presented to him very strikingly in the course of his researches. He says that, with reference to the impairing of the health by this cause, he has no doubt that it “is one of the sources which it

is absolutely necessary to remove, before there can be any effectual cure. Some of the cesspools are in the cellars, and give out their exhalations from thence; others are in a yard close to the door, which door is always open on account of the want of windows in the passage. I continually visit houses, in which the smell from the cesspool, throughout the hole of the house, is so noxious as to be unbearable; and have found the poor lodgers miserably shut up in their rooms, no air being allowed to enter by door or window, with the hope of excluding the offensive effluvia. When I have proposed to ventilate some of the rooms by means of the window ventilator, the occupants have made the well-founded objection, we are afraid of an opening in the window, on account of the bad smell which comes from the yard.’ I perceived at once, that installing a ventilator in the window, would only have been the means of introducing this noxious air.” Were it necessary, we might adduce much additional evidence in corroboration of the view under consideration; this,

however, we deem unnecessary, it is so very self evident. In discarding cesspools, then, it is requisite to make a receptacle to contain the liquid exuvia, which is, in any case, too valuable to be thrown away. In an agricultural or suburban district, where the manure is so very useful for arable land, or garden plots, it would be utterly inexcusable to adopt a plan of drainage which would result in its loss. The liquid manure-tank should be placed as far from the house as possible. The form generally used is an excavation made in the ground, lined with brick, set in Roman cement, or blue lias lime mortar. If not exposed to any undue wear and tear, the cement will keep good for a great length of time—last nearly, if not quite, as long as the bricks. Pitch, and similar materials, are sometimes used to line manure tanks with, but they are not recommended, inasmuch as they are apt to peel off if not of excellent quality, and tend to choke up the drain. If the manure tank is not of great dimensions, the excavation may be lined with boards, and the whole covered internally with gutta percha sheets. This would form a completely water-tight and cheap tank. All tanks should be furnished with air-tight covers, provided with a man-hole door. In fig. 1, we

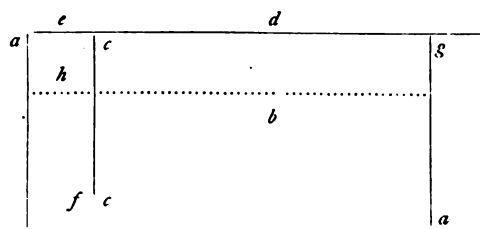


Fig. 1.

give a sketch of a liquid manure tank, being a modification of an improved form described by Mr Allen. *a a* is the tank; a division, *c c*, is placed at a convenient distance from the end—say 12 inches, in a tank the length of which is 5 feet—and stretching right across the breadth. This division is perforated with a plate of perforated zinc, placed at the bottom at *f*. The liquid manure entering from the drain *g* fills the part *b*, depositing its solid matter at the bottom; the comparatively fine liquid passing through the perforated

bottom *f* into the division or well *h*, from which it may be withdrawn through the hole *e*; a man-hole at *d* is also provided. These should have air-tight covers. As the liquid portion is the most valuable for garden purposes, by this plan it can be easily withdrawn, without disturbing the solid matter. In cases where liquid manure tanks are used, there is one point which obviously requires close attention, and that is the withdrawal of their contents from time to time, so as to prevent the undue accumulation, and consequent escape to the surrounding earth. It is very clear, that if liquid manure tanks are allowed to become over-full, their efficiency is impaired, and they are apt to become, although, perhaps, in a less degree from the peculiarity of their construction, as offensive and dangerous as the open cesspool. In the form we have figured, the arrangement for removal of the best part of the manure, namely, the liquid portion, is very good. For the withdrawal of the more solid portion, the man-hole door or cover must be removed. This should be pretty large, the minimum size being about 30 inches square.

Farm Implements and Machines.

NOVELTIES AT THE SMITHFIELD SHOW.

SHEPHERDS who are in the practice of folding their sheep upon turnips, are aware of the necessity of changing the hurdles at judicious intervals, so as to divide the animals new ranges, and enable them to graze evenly on the soil, and manuring of the soil uniformly done as possible. This

of the enclosing appliances is by no means a matter of some little trouble; but when netting is used, it is by no means so much a matter in severe weather for the shepherd to handle any great length. The application of mechanical for manual labour, in this operation, is one which bids fair to be of great service where extensive sheep folding is a feature of farms; and we have, therefore, pleasure in directing the attention of our readers to a very ingenious and yet simple arranged mechanical contrivance by which netting can be put down with great rapidity very quickly, as compared with the old method. This appliance is the invention of Mr R. Winder, of Farningham, Kent, and of which the following is a description:—

1.—SHEEP NET WINDER.

The roller is made to hold 100 yards of netting, and is most convenient for one man to operate. Wherever it is required, the weight of the netting is about 1 cwt. The shifting of the rollers is simple, easy, and quick. The netting is evenly wound upon the rollers when in use, instead of being left in heaps on the ground, to rot from wet, as was the case. The mode of working is as follows:—For laying out the net, a wrought-iron standard is fixed in front of the

The centre ring on the lath at the end of the netting is fixed to the centre hook

of the standard; the man draws the machine forward by the end handle, which lays out the netting evenly along the ground. The ordinary stakes are fixed in the ground at about 12 feet apart; each stake has two 4-inch clout nails driven in them at about 3 feet apart, the lower one being about 1 foot from the point of the stake. One turn is given on each nail, and the fold is fixed between the 12-foot distance; the bottom of the net is pegged to the ground, to keep the sheep from getting under. To shift the fold, all that is necessary is to untwist the net off the nails, pull up the stakes and wind the netting on the roller; while winding, the machine travels towards the fixed end standard, and it travels very easily and light, on account of the machine weighing only 1½ cwt.; the diameter of the large wheels being 3 feet, assisted by springs, rise easily over obstacles, such as large stones, turnips, &c.

As compared with hurdles, 500 yards of netting and the machine weigh altogether about 6 cwt.; whereas 500 yards of hurdles weigh over 5 tons. A pony and cart can take all stakes, net, and the machine tied behind; but to bring the same length of hurdles into the field requires four horses, waggon, and two men to load and unload, and also in making the folds. The shepherd and his boy easily fix the net; and all carrying of hurdles from one part of the field to the other is dispensed with—a very laborious part of the shepherd's duty. Spaces for the young lambs to get through, can be left at each end of the netting. The netting is generally made in 50-yard lengths, and each length is joined together by a lacing of tarred twine.

The destruction of the netting can be easily prevented where rabbits abound, by tarring

the netting, when it will not be touched by the animals.

2. NEW ASPHALTE.

The formation of floors of farm buildings in a material at once lasting, easily laid down, and capable of resisting the ravages of damp and of vermin, is a matter of very great importance. It is one which, however, has in many instances been greatly neglected, if we are to judge from the numerous examples of bad flooring we have seen; this being more especially marked in the case of floors of stables, cow-houses, and the like. In these buildings a floor impervious to damp rising from below, and to water percolating from above, not easily broken by the action of the feet of the animal, smooth on surface, so that it can be easily kept clean, and yet rough enough to give "bite" to the feet of the stock using it, is of great value. To attain it at a moderately cheap rate, various plans have been prepared, and various materials have been employed. Of these, asphalt has enjoyed a reputation of a very varied character; in some places where used it has given high satisfaction, and in other places no satisfaction at all. The reason for which may be summed up in a paraphrase of a pithy French proverb, and which paraphrase we put thus—"There is asphalt and asphalt." When the true asphalt is used, satisfaction will be obtained; but when a mixture of stuffs, as coal tar, and inferior pitches, lime, chalk, &c., are used, and the mixture called asphalt, satisfaction will not be the portion of those using it. We were glad, therefore, to see, in the interest of the farmer who wishes to have a good material at command, that the Val de Travers Asphalt Company have, by exhibiting at the Smithfield Show, entered an appearance in "agricultural circles." The asphalt used by this Company is obtained from mines in Switzerland, and is used by them in its genuine condition, and hence results of a very high order in practice obtained. Their asphalt is used very extensively in Paris for the carriage-ways and footpaths, and any one who knows Paris knows how these excel ours. The following is a statement of a few of the uses to which their asphalt can be put:—

Stables, Cow-Houses, and Piggeries.—The constant recurrence of epidemics both among horses and cattle have recently occupied a great deal of attention both of the public and the Government. It can hardly be wondered at, that unhealthiness should be prevalent, when we remember that in all stables and cow-houses which are paved in the ordinary manner, the soil below the pavement becomes thoroughly impregnated with the urine, and the consequence is, that the joints exhale the miasma fatal to the health of the animal. The Val de Travers Asphalt is admirably adapted to counteract this evil. It is not in itself deteriorated in any way by the urine, and the whole being without joints and seams, it is hermetically sealed, so that the foundation is as sweet and dry years after its being laid, as it was at first. It is, therefore, evident, that it is much more wholesome than any other system of paving. In addition to this advantage, it is found by experience that the saving in the use of straw, by the entire absence of the deleterious matter referred to above, is very great. It is prepared in the same manner as for footpaths, but the surface made much more rough, and in some cases with indents, in order to form a good footing for the animals.

Flooring of Corn-Stores, Barns, &c.—As a certain preventative against damp, and as a sure safeguard against the inroads of vermin of all kinds, this asphalt will be found of great advantage; in such cases the walls should be coated inside with the asphalt to the height of 2 to 4 feet, which will be an absolute security against vermin. It was often a matter of wonder how the ancient Egyptians and Romans preserved so well the grain for years. Recent explorations have shewn that all the stores in which they deposited their corn were lined with a bituminous compound, which effectually prevented decay, invariably arising from damp. On the Continent, recently, many barns have been built on the ancient model, and with the same results.

3. LAWN MOWER.

The "Archimedean" Patent Lawn-Mower is an American invention, which has been

Novelties at the Smithfield Show

in the United States, where many
ands of them have been used. It is



Archimedeal Lawn-Mower.

simple in its construction, and does not
liable to get out of order. The "Archi-

struction in advance of it. By the ac
the revolving cutter, the grass is c
small particles, and evenly scattered
ground where it is cut. The inventor
mends that the cut grass should not b
up, but allowed to remain on the gro
it serves as a mulch to protect the r
the grass from heat or drought. This
cuts equally well grass which is wet w
or dew, and never clogs. According
inventor, this mower "can be worke
ease, and double the work can be do
it in the same time, and with less
than by any other mower; traversi
mounds or sloping terraces with equ
and preserving its perfect cut." W
perhaps, have an opportunity of pra
testing this machine in the spring, an



Archimedeal Lawn-Mower in operation.

an" revolving cutter takes the grass as we shall have something further
ids, there being no roller or other ob- about it.

A marked feature in the history of mechanical progress is the manner in which inventions, in a certain line, are brought out quickly, one upon another. So marked is this feature, that at times what may be called a kind of mania takes possession of the minds of our mechanicians, and they devote themselves to running in the one groove in which so many seem inclined to run. We could multiply instances of this, but we content ourselves with one only, it being brought specially to our minds through the agency of one novelty which we purpose presently to describe—we refer to the class of mill-stone dressing machines. The impulse to mechanical invention in this department undoubtedly arose from the shewing of Golay's machine at the Paris Exhibition of 1867, and which impulse was quickly aided, if indeed not altogether brought into existence, by the somewhat romantic after-history of that machine, and of the almost fabulous fortunes which its favoured purchasers made out of it in this country. Since, then, although we cannot say that the names of the machines brought out claiming to be better than Golay's celebrated machine are "legion"—like some other departments we could name—still a very considerable number have been brought out, and are now claiming the attention of mill-stone dressers. Amongst them there is the one we now propose noticing, and which was exhibited at the Smithfield Show by Messrs J. L. Norton & Co., 11 London Street, Fenchurch Street, London, under the name of the *Mortlock Patent Mill-stone Dressing Machine*.

Golay's machine, like that of the others which succeeded it, possessed this peculiar feature, that it was arranged to do, by mechanical movements, what had previously been done by hand. There is in such a proposition something taking to the mind of those engaged in the arts and sciences, from the fact, which is the most prominent of all the facts connected with self-acting mechanism, that there is greater precision in the work done, and greater economy in the doing of it. This is a general rule, but which, in some instances, has exceptions: these exceptions

presenting such features as make it, to say the least, exceedingly doubtful whether anything is to be gained by the use of self-acting mechanism, which is of necessity more or less complicated, to do a work which is of a simple character; and there is about the position of matters in such cases that which forcibly reminds us of the absurd story told of the vendor of a powder for the destruction of that nimble insect the flea, which was first to be caught and then have the powder administered to it,—the obvious conclusion in most minds being, that when caught, a quicker method of destroying the lively flea could be at once put into requisition, by simply then and there *squashing* it.

The perfection of merely manual labour is only to be gained by the exercise of the highest degree of manipulative skill; and as this varies with various workmen, the work varies in degrees of excellence; but if, in certain comparatively simple operations, such as that of mill-stone dressing, that amount only of mechanical contrivance necessary to secure to a certainty the necessary degree of precision of working can be obtained, without involving any complicated mechanical movements, a point may fairly be considered as gained. This is precisely the direction taken by the inventor of the machine now under consideration. Manual labour is brought into requisition, but in such a way that its precision is secured by the adoption of mechanical means of the simplest character. Let the reader conceive of two parallel bars of metal, joined together by cross bars at each end, and of such a weight that, when placed upon the surface of the mill-stone to be dressed, it will remain in position without any special means to fix it there. The inner sides of these bars are provided with grooves, along which a cross carriage can be made to move to and fro by means of a handle, which the attendant grasps. This carriage carries with it the cutting or dressing tool, provided with a cutting diamond, which makes the groove in the face of the mill-stone. The tool carrier can be raised or lowered in the cross carriage, so as to take any depth of cut required. When

this carriage, with its cutting tool, is moved to and fro by hand, the reader will perceive that the diamond will make a groove in the face of the mill-stone, which groove will be perfectly parallel to the faces of the bars which support the cutting apparatus. The only thing now to be done is to provide a means of moving the tool in a direction at right angles to the length of the grooves, so that any required distance between them can be secured. This is done by a very simple and ingenious contrivance. The tool carrier slides on the upper edge of the parallel sides of the cross carriage, and a screw passes through it, which screw is also parallel to the sides of the cross carriage. At one end of this screw a toothed pawl or wheel is fixed, and as each movement of the cross carriage brings it up to the end of its path, a catch fixed to one of the bars of the machine resting upon the stone, takes it into one of the teeth of the pawl, turns it round a certain distance, with it the screw, and this acting upon the tool-carrier moves the diamond point a certain distance away from the groove last made, and it is then ready to be pushed forward by the hand to make another groove. As the majority of mill-stone dressing machines brought out since the introduction of the Golay machine, possess some of its distinguishing features, so does the one now described possess some of the peculiarities of arrangement of the Touaillon machine which we described in vol. ii., page 226.

4. MILLSTONE DRESSING MACHINE.

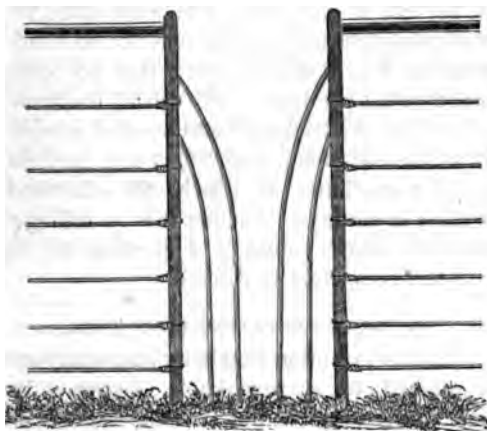
The inventor claims for it many advantages over all other machines yet introduced, viz., the simplicity of its construction, which renders it the most perfect machine yet introduced for the purpose; not liable to get out of order; moderate cost; rapidity and cheapness with which a stone can be dressed, as one man can dress a stone in about an hour; only one hand is required to work it, no gearing or motive power of any kind being required; the machine is very portable, no fixing of any kind is required, so that the dressing may be commenced immediately the

machine is placed upon the millstone; the face of the stone is kept perfectly true. It will put the work or dress into new stones, and will cut the stones to any depth required, and will also do the furrowing, when necessary. Stones can be easily dressed lower at the eye if required. The work done by this machine is not only far superior to hand-dressing, but it will do work that no other machine has yet done. The cutting is accomplished by the backward and forward motion of a black diamond, and differs thus far from Golay's machine, in which the diamond rotates in cutting. Whether it is an infringement of Golay's patent, is a question we do not feel competent to discuss.

5. BIRKWOOD PATENT BIPED PASS.

In this invention simplicity and utility are combined in a remarkable degree. Its superiority over the old turnstile—stile with steps or hinged wicket gate—is very marked, and is obvious at a glance. Its grand peculiarity lies in the apparently paradoxical fact, that it is always open, and at the same time always shut, so that there can be no derangement of latch or hinges; no danger from the wilful or careless neglect of the injunction "Please to shut the gate;" and no laboured necessity of climbing over a fence. It is open to foot-passengers of ordinary stature, whether male or female, who can step through it with the greatest ease, and without the slightest trouble; whilst it is shut against, and impassable by small children, and all animals who present a front wider than the diameter of a man's leg. Its capability of resisting the passage of cattle, sheep, and lambs has been put to the severest test. The experiment has been tried of placing a quantity of tempting provender on one side of the "pass," with a number of animals of these classes on the other, when their most anxious efforts to reach the provender were thoroughly frustrated. It requires no attention; cannot, with ordinary usage, go out of repair; and can be constructed of any strength. To railway companies this "pass" must prove of special importance. It will obviously allow them to dispense with the ser-

vice of keepers at all foot-passage gates; and, erected at short distances in their fences, it will secure to their labourers and others the desirable facility of passing to and from, or over their lines, without the necessity of a journey often long and circuitous. And where



The Birkwood Biped Pass.

railways are carried past dwelling-houses, or through villages—as is frequently the case, particularly in mining districts—the erection of these “passes” will prevent children from wandering on to the lines, and put a stop to the danger, and allay the anxiety, that naturally arises where they have it in their power so to wander. These are certainly advantages that cannot be over-estimated. And

we are assured that the enterprising wire fencing firm, Messrs A. & J. Main & Co., of Glasgow, London, and Dublin—with whom the patentee has entered into treaty for the use of the invention, and who are most enthusiastic in regard to its importance—are prepared to insert 400 of these passes into every 100 miles of wire fencing on railways, being four to each mile, at no extra cost, and, we believe, they will insert them into their iron fences anywhere in the same proportion, and at the same rate. In existing fences the expense of their erection would be but trifling. In fences throughout gentlemen's grounds, on farms, and in thickly peopled districts, where enclosures are small, this “Pass” must prove of great advantage. And when erected contiguous to a large gate, such as that of a carriage way or cart road, through a wire fence, its importance is specially discernible. In such a position it most effectually prevents the dislocation of the gate, and its disturbance from its proper bearings, which is the natural result of the incessant strain of the wires on the posts to which it is attached, and a constant source of trouble and annoyance. The advantages of this admirable contrivance are, in fact, so signal and numerous, that we hesitate not to predict its speedy reception into public favour. In order to be appreciated, it requires only to be known.

THE DOUBLE-FURROW PLOUGH.

IN the present advancing state of agriculture in this, as well as in other countries, it becomes the bounden duty of the journalist to take cognisance of anything that is likely to contribute towards that advancement. If the statesman be expected to educate his party to waive their claims, or insist upon their rights, as the case may be, on pressing questions of the time, so is the Press ex-

pected to speak out with no uncertain sound on matters of importance to its subscribers.

The cultivation or tilling of the soil has been a question engaging the attention of agriculturists in all times. If the speculation happened to be remunerative upon an easy-going, let-well-alone style, the rudest weapons of agricultural warfare were accepted as instruments sufficient for the day and the work.

As years roll on, and population increases, with the progress which of necessity must be contemporaneous with it, there comes an increasing demand for food, which the marts of the earth are bound to supply. Necessity, truly, is the mother of invention, and the question occurs to reflective minds, how shall we go to work to increase our food supply? Nations imbued with the overwhelming influence which is pressing upon them on all sides, are setting their houses in order, not to do battle at those scenes of carnage with which every reader of history is familiar, but to display a glorious rivalry in that commercial field which rouses not the worst passions of men, but their mental activity and physical exertions to contribute to the social comforts and well-being of mankind.

To do this effectively and well, in any country and by any people, economy must be the order of the day. Not that parsimonious economy practised by those who may be looked upon as drags upon society, and who have difficulty in moving out of the rut of ancestral practice. That may be presumed to be niggardliness, which cannot exist to be healthy, in these our times. In order to give landlords increased rents, and farmers increased profits, there must be a general energy displayed of a very different kind from what was manifested at the beginning of the century. Busy brains and inventive minds cannot rest contented with ordinary results when extraordinary are possible; and therefore we hail the introduction of the double-furrow plough as one of the best helps that has ever been devised for reducing the expenditure side of the farmer's balance-sheet, and, what is of national importance, contributing to the advancement of agriculture, in creating greater facilities for an increased food supply.

When we consider the vast importance of the economising of labour, the value of this double-furrow implement can scarcely be estimated. Commercial men, in other walks of life, declare, that but for strict economy of management and production in the respective departments, a respectable living could not, now-a-days, with any degree of certainty, be calculated upon, so keen is everything

"cut" in a business way. If farmers, therefore, can count upon remunerative returns under the use-and-wont *regime*, they are fully in as good a position as many of their urban brethren. To be sure, many of the agricultural element give, not only personal supervision, but physical strength, to derive an outcome from what their money is invested in, and they are entitled to a corresponding return. If, however, the labour of the field—the thing that costs money—can be simplified or reduced in any way, so much the better for those more immediately concerned.

That this implement is capable of doing double the amount of work of either the common wheel or swing plough, we do not, for a moment, entertain a doubt. On several trial-fields, where a variety of implements were to be seen at work, on stiff plastic clays, on intermediate loams, and on the lighter soils, many of the implements did excellent work. We, therefore, have no sympathy with those who would endeavour to pooh-pooh this novel implement out of court. One can well understand the possibility of and necessity for improvement in some of its parts; that both implement makers and ploughmen—the one in forming the article, and the other in guiding it—have each something to learn which must be accomplished entirely satisfactory as each gains in experience. To our minds, speaking comparatively, there will be neither the task, from a skilled point of view, nor the physical depression after a day's work, upon the part of the man; nor, as a rule, will there be anything like punishment in the physical system of three horses with one plough, as against four with two common ploughs. Modern implement makers have mastered the draught in such a way as was unknown even in the days of Small, Lord Somerville, and Wilkie. Even taking the best modern single plough, looking to dynamometer tests, it requires more than half the traction of a first-rate made double-furrow. On examination and reflection, it is perfectly obvious, for, in point of regulation and steadiness, the best single wheel plough, with the best art to guide it, cannot at all cope with an implement that has

not only foundation, but seems in all its parts to be so nicely adjusted as to require little or no interference, the principal object of the man being to guide his horses. The skilled ploughman, upon whom farmers used to plume themselves so much, is rendered less absolutely necessary than ever, the only thing involving judgment being in the proper adjustment of the plough to the kind of work desired. Manufacturers have made admirable provision for satisfying farmers' wants in that respect.

Talking of draught and dynamometer tests, we actually saw a single plough in Kent, drawn by six horses, ploughing over 13 cwt. draught. The land was stiff, certainly; but the plough and its irons were so badly constructed that a double furrow of Gray's did better work on lands at some little distance, drawn by three horses, ploughing from 7 to 8 inches deep. And then, if we look to the various trials that have taken place in Scotland, we find the draught varying from 5½ to 8 cwt., and the work, both in stubble and in lea, such as call forth high encomiums. Whether we look to stubble or lea ploughing, we find convincing proof of double the amount of work practicable, at a greatly reduced cost of production.

Agriculturists, both at home and abroad, should not, and are not likely to lose sight of the economy of employing an implement of this kind; there is no appeal so eloquent

as that which does not interfere too freely with the breeches pocket; and farmers, generally, are credited with being fully alive to this. In various counties in England, where the fine single-furrow wheel ploughs of Ransomes, Howard, and others, have not been introduced, the saving by purchasing some of the best double-furrows will be something considerable. In some cases, the services of as many as two horses and one man can be entirely dispensed with. In Scotland, where the best modern single ploughs are largely employed, a horse and a man will be a clear gain to farmers with holdings of only moderate extent. In our Colonies, and abroad generally, this is sure to be the leading article in demand. It is the best handmaid that has ever been devised for accelerating the general work of cultivated farms. It will act like a consort to the steam plough at home and abroad, and will be largely sought after for many years to come. It might be added, that we look upon such a traction-engine as that exhibited by Thomson in the yard of the Royal at Manchester, and at the Highland and Agricultural Society's Show at Edinburgh, as destined yet, in conjunction with either a triple furrow or double-furrow plough, to play an important part in advanced agricultural husbandry.

We shall devote another article shortly to the analysing of the various trials that have taken place, and the ploughs that have taken a leading position thereat.

Our Pasture Grasses.

*POA ANNUA**—ANNUAL MEADOW GRASS (Linnæus).

SYNONYMS.—*Gramen minimum album*, and White Dwarf Grass of Gerarde, 1596. *Gramen pratense minimum album*, and the Least White Meadow Grass of Parkinson, 1640. *Gramen pratense paniculatum minus*, C. Bauhin, 1671. *Gramen pratense minus vulgatissimum*, J. Rajus, 1686. And among agricultural writers of the last century it was known under the name of Suffolk Grass.

DESCRIPTION.

ROOT annual, fibrous, and tufted, but in moist weather occasionally protruding from the lower stem joints of strong plants. Stems from 3 to 12 inches in height, produced in succession throughout the year, varying from nearly procumbent to upright, smooth, flattish, having four or five smooth joints, with a like number of leaves, all of which are of a light green colour, flat, or occasionally crumpled, somewhat flaccid, and smooth, except on the edges, which are roughish, the upper one being shorter than its sheath. Inflorescence in compound, one-sided, broadly-triangular panicles, the branches of which are mostly in pairs, the lower ones often becoming horizontal or slightly reflexed when nearly matured. Spikelets usually containing from five to eight webless and awnless florets or seeds, that are frequently variegated with green, white, and purple. Calyx of two unequal rather acute three-ribbed glumes. Paleæ, or seed scales, two on each, the outer or larger being five-ribbed, and the other with two marginal ribs. Anthers drooping and notched at each end. Flowers and ripens seeds abundantly throughout the summer, as well as in mild open winter weather.

NATURAL DISTRIBUTION.

This is the commonest and most widely diffused of grasses, abounding in all countries of Europe, northern and middle Asia, Northern Africa, North America, and in different

parts of South America. Dr Hooker found it along with its scarcely less troublesome weed associate, the Shepherd's Purse, growing on a Yak path in East Nepal, at an altitude of nearly 13,000 feet, and also in the outer Himalayas, at between 7000 and 8000 feet, but states that it does not occur in Lower India. Neither does he include it in his Flora of New Zealand, although it may be found in cultivated ground there, as well as in other southern colonies, where it has been accidentally introduced with other European plants. In Britain it is everywhere abundant in cultivated districts, ascending to altitudes of above 4000 feet, wherever the natural surface has been broken up by foot-path, or otherwise. It is the first weed that appears in newly-dressed grounds, causeways, gravelled roads, walks, &c. And it thrives in over-shaded, air-stagnated city plots, where no other grasses, and but few kinds of other plants, will grow.

QUALITIES AND USES.

Although by far the most troublesome of annual weeds, and notwithstanding its diminutive growth, this was one of the grasses recommended for cultivation by Stillingfleet, Lord Kames, and other agricultural authors of the last century. The former stated, as his opinion, that it was likely the best grass for dairy cows, and was called Suffolk grass, from there being whole fields of it in the best dairy districts of High Suffolk, without any mixture of other grasses. *The Gentleman Farmer* included it in a list of six grasses, of which the most valuable pastures in both

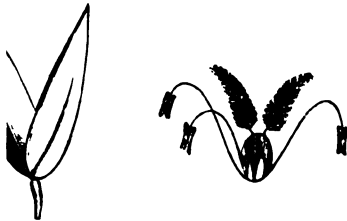
* From *Poa*, grass or pasturage, *por*, to feed; and *annua*, from its being of only annual duration.



Poa Annua (natural size), shewing habit of growth.

l and Scotland were mostly formed. ture in those parts of the London and y parks which are in closest proximity ling-houses, or other buildings, is and in some instances wholly, com- of *Poa annua*; as is also the grass in town drying greens and gardens. And standing its diminutive size, the of its growth, and reproduction of en either eaten or cut down, is such

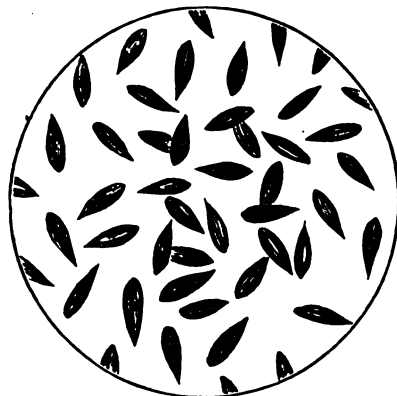
Notwithstanding that the *Poa annua* is thus useful, under special circumstances, as a grass for both pastures and ornamental lawns, cultivators generally prefer to look upon and treat it as the worst of all annual weeds, the extirpation of which demands their careful and persevering exertions. This is only attainable by keeping it under what has been aptly termed "the economic point," or destroying the young plants before they have ripened their first seeds. To accomplish this requires considerable vigilance, seeing that no other weed produces these in such rapid, abundant, and uninterrupted succession. A single seed sprouting on the most sterile soil, will, in two or three weeks of favourable weather, ripen its first panicle, containing from fifty to sixty



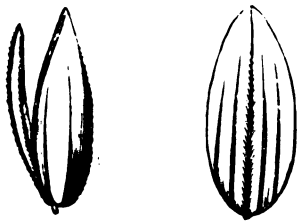
: magnified. Anthers, &c., magnified.

annual produce may rival in bulk many much larger kinds. Hence, ls are sometimes sought after for n such as the above-mentioned local- l they would be in much more general , could they be collected and sold as as those of other commonly cultivated

n on a rich black loam in the Woburn garden, and cut about the middle of



Seeds, magnified three diameters.



ret magnified. Outer Paleæ magnified.

e Annual Meadow Grass produced at of 5445 lb. of grass, or about 1906 lb. d hay per acre. While Pacey's al rye-grass, from a rich brown loam, at the time of flowering, was equiva- about 7827 lb. of the former, and 3389 he latter. But had the yearly weight uce in both been ascertained, that of t would, doubtless, have stood much o the latter.

seeds, although the plant may not be 2 inches in height; while a moderately-sized plant, of from six to eight weeks old, will, in ordinary soil, have borne and partly scattered the almost incredible number of 1200 to 1500 seeds, the first ripened of which will then have, in their turn, grown into seed maturing plants. Among cultivated crops, hoeing in dry weather and digging down in wet weather, before the first panicles are protruded, are the best modes for keeping this grass under. But for cause-way, gravel walks, roads, &c., where salt can be used without injuring other vegetation, the cheapest and best way of destroying it is to apply about 20 bushels to the acre, which quantity, if scattered regularly over the surface, will appear as if the grains of salt were touching one another, and effectually

destroy this and most other kinds of weeds, provided the application is made in dryish spring or summer weather; but if a continuance of heavy rains happen immediately after, the salting may have to be repeated, and it will have little or no effect if spread on towards the end of autumn or in early winter.

SEED AND SOWING.

Seeds small, plump, and without the downy or cob-web-like appendage at their base, which is present on those of the other two commonest species—*Poa pratensis* and *P. trivialis*. In length they are about eight to the inch, and when magnified, bear a considerable resemblance to barley, or to Dantzic wheat, when their adhesive palæ or covering is rubbed off. About 200,000 seeds are contained in one ounce, and their average weight may be stated at 21 lb. per bushel. The greatest number of them braid when sown on the surface, or if their earth-covering does not exceed a-quarter of an inch. About half of that number vegetate when covered to a depth of from a-half to three-quarters of an inch, and none come up from under an inch and a-half of soil. Although the seeds of *Poa annua* are occasionally inquired after, the demand for them is comparatively limited, partly in consequence of the high price charged for them, arising from the difficulties which attend their collection or harvesting, as they not only ripen in succession through most of the year, but when they approach maturity the stems become more or less declined or prostrated, so that, in culling, whether by scythe or machine, many of the heaviest and best filled panicles escape. As, however, it naturally appears in all places where its presence is desirable sufficiently thick growths of it are secured by taking care that it is never so overgrown as to be so close as to preclude the sowing of other seeds.

CHEMICAL ANALYSIS.

The Woburn analysis shewed about 213 lb. per acre of nutritive extract, or fully more than two-thirds that of Pacey's rye-grass. While the following results were obtained by Professor Way from specimens collected on the 28th May 1849, from meadows in the vicinity of Cirencester, viz.:—In a fresh state, water, 79.14; albuminous or flesh-producing principles, 2.47; fatty matter, 0.71; respiratory principles—starch, gum, and sugar, 10.79; woody fibre, 6.39; mineral matter, or ash, 0.50. In a dry state, albuminous or fat-producing principle, 11.83; fatty matter, 3.42; respiratory principles—starch, gum, and sugar, 51.70; woody fibre, 30.22; and mineral matter, or ash, 2.83.

VARIETIES.

Few grasses reproduce themselves with the same undeviating certainty as does the *Poa annua*, whether as regards form, colour, or habit. Some apparent differences, such as in size, and presence or absence of variegation on the spikelets, are traceable to the influences of soil and exposure; but the distinguishing characteristics are pretty constant in the two following varieties:—

P. annua angustifolia.—A narrow and somewhat glaucous-leaved, rather slender growing form, occasionally found in the vicinity of the sea, such as by the waysides and in the waste grounds of fishing villages.

P. a. serica.—Leaves short, plain, and never waved or crumpled, as is frequent in the ordinary form, from which it is further distinguished by having more prominent, thinner, and more bluntly-pointed ligules; spikelets usually with only three, instead of five to eight florets; and by the two lateral ribs of the outer palea, or adhesive seed-chaff, not being smooth, but covered with white silky pubescence. Frequent in moist and marshy cultivated ground.

The Farm.

MORE WORDS ABOUT CATTLE.

THE temperature of the buildings in which cattle are kept is a matter of considerable importance, and one to the attention it deserves has not been fully given. It seems rather late in the day to say this, after so much has been said in the pages of agricultural journals, discussed at the meetings of Farmers' Clubs, on the subject of the Chemistry of Feeding. Yet it is true, nevertheless, in spite of all this, comparatively little evidence is seen as to the effect it has had in the case of farmers, else, how comes it that after year passes over our heads—the old ways of winter come and go again—and yet old ways are walked in? Cattle are subjected to conditions of atmospheric changes which are as costly in their effect upon the animals as they are indubitably cruel; and the lessons of experience—the presence of sickly animals and of food consumed, for which there has been no adequate return, are of as little weight practically as those of theory and of science. Let it be understood, that the food of all animals is made up of various constituents, each of which, or each group of which, performs special functions, one group going to the maintenance of the animal tissues, another group to that of the animal heat; and it will not, it should be, at once observed, that if you subject the animals to conditions in which a certain degree of the temperature of their surroundings is withdrawn, you do one of two things—you either must increase the supply of food to make up for the heat lost, or you must raise the temperature of the body to be kept; and when that is the case, the condition of the animal is no longer that which it

ought to be. We need not go to modern science to tell us this; those who think so highly of the wisdom of our ancestors will find that wisdom embodied in an old saw, "Heat is Meat." But science tells us, and it is a safer and surer guide than the wisdom—if wisdom it always is—which is embalmed in old sayings, that not only do the food constituents, which are chiefly heat-producing, keep up necessarily the temperature of the body; they go largely to the production of fat. We do not lose sight of the fact, that some savans maintain that fat also is produced by the nitrogenous constituents of food, the main office of which is to keep up the tissues of the animal; but the majority of scientific men hold that nitrogenous food does not yield fat; while it is generally held that non-nitrogenous food, while being heat-producing, is also fat-producing. Now, fat-producing food is dear, and if we keep the animals in such a low temperature as to force them to draw upon the fat-producing foods for heat-producing effects, the loss sustained must be obvious enough. We have, indeed, only to take note of what happens to man when exposed to cold: we all know that more meat is consumed in winter than in summer, that is, with those who are fortunate enough to have it to consume; with those who, alas, have empty cupboards and cold hearth-stones, the same truth is sadly told us, and another evidence of it given in the fact, that if the starved poor can get but a warm fire to sit at, they do not feel the pangs of hunger so much; hence this saying, "We would rather have a fire than meat." This is, of course, an exaggerated way of putting the case—but poverty is apt to

deal in hyperbole—still it conveys the truth of what we have been advancing, that Meat is Heat, and conversely, warmth is equivalent to the giving of a certain amount of food. Hence the fact is deduced, which we know to be a fact, that less food will be required by animals kept in warm comfortable byres, than by those exposed to cold and wet; less we mean if the same degree of condition is carried out,—if, indeed, the same condition can be maintained with animals kept in such very opposite circumstances.

It is, perhaps, too advanced a notion to advocate—namely, the artificial warming of the buildings in which our cattle are fed; but still such are the advantages of artificial warmth that we do not hesitate to say that its adoption would pay. But, meanwhile, till such an advanced notion comes to be generally realised, if, indeed, it ever becomes so—which, by the way, we admit is rather questionable—many of the advantages of artificial warming can be obtained by having well-built houses, good doors and windows, and plenty of good litter. But while warmth should be secured, a high temperature should be avoided. We look upon that of 60 degs., as a general rule, to be the best. One immense advantage which artificial warming would give, would be the maintenance of a *uniform* temperature. The importance of this all will understand, for all know the danger of changes of temperature. But with warmth, ventilation should be secured, and here, again, come in the advantages of a system of artificial warming; for with it ventilation is an easy matter.

This naturally brings us to the “littering or bedding.” We here refer more especially to stall-fed cattle. The material, it is unnecessary to say, most generally in use is straw. There are two ways of using this—the scanty and the liberal. Some give such a scanty supply that we are reminded of the Irishman who, when put into a sedan chair without a bottom, said that if it hadn't been for the name of the thing he might as well have walked. So it is with what some consider a supply of bedding; that if it was not for the

name of the thing they might as well be without it. The other plan errs just as much on the other side; so much is given that a large proportion of it is wasted; and it gets into the manure heap or dung pit in a very unfit condition to make good manure. The practice will seem to many a tedious and anything but an economical one, to cut the straw in the chaff cutter before using it for bedding; but we can promise, after some experience of its use, that wherever adopted it will be persevered in, as thoroughly efficient and economical. Where a steam-engine is employed, a very large quantity can be cut in a short time, and this can be done by hand even when the straw-cutter is a good one—such as that sold by Richmond & Chandler, of Salford. One great advantage obtained by the use of cut straw is the ease with which it can be spread evenly in the stalls. When this is done, the absorption of the liquid is better secured; and by a very little expenditure of time, the whole can be turned over so as to expose fresh surfaces, thus securing an excellent condition of stuff to be taken to the manure heap or pit. The longest length which the straw cutter gives—usually $\frac{3}{4}$ of an inch—is the one we adopt. The same advantages obtained by the use of cut straw are obtainable by the use of leaves, sawdust, and tanner's bark; all of which are what is called “short,” and form excellent manure when mixed with excreta of the stock. Many of these substances are met with in some districts in large quantities, and should be used regularly when so met with. A good deal of the comfort and cleanliness of a stall depends of course upon the way in which the floor is made. The worst material is the round knobby stones so often used. Not only do these give a hard and thoroughly uncomfortable bed, but the interstices between the stones take up and retain the dirt, and which, being difficult to take out, often—we may say always—becomes highly offensive. Brick on edge floors are pretty good, but the joints require to be carefully cemented to prevent the accumulation of soil between

joints. Some, again, prefer to have led platforms, moveable, upon which the lie, these being simply placed upon the dry earth of the foundation floor. In case, the wet, percolating through the slats, makes the soil below in a very bad condition, so that to make the stalls perfect, the parts under the boards should be paved. We know of no floor better than the "concrete" floor, of which we speak most favourably; it is easily laid by any common labourer; it is clean

and smooth on the surface, so that it can be easily kept clean; and minor gutters, or channels, can be made in it with the greatest ease, these running into the main gutter in front of the stalls.

The point we have here most briefly discussed—of bedding or littering of house-fed cattle—is one of great importance, for there can be no doubt that an animal will thrive better, and give more fat and meat, if comfortable and easy, than when the contrary is the case.

FARM-YARD MANURE—HOW BEST TO KEEP IT.

BETWEEN the worst mode and the best mode of keeping farm-yard manure is a very wide interval indeed. Nor is it any means a flattering thing to say that a large number of farmers use the worst mode, and persistently use it in the face of what can be said against it. This worst mode is, therefore, easily enough described, abundant examples exist in almost every district for description. Heaped up in some places on the road side, without any previous preparation of the soil upon which it is laid, it is allowed to lie for weeks and sometimes months—nay, we have known instances where it has lain for *many* months, as if object or pride of the farmer was first to accumulate and then to retain it as a treasure valuable to be parted with, although hungry soils are waiting to be enriched by it. If exposed to the sun's rays and the rains, it gets, ultimately, blanched and wetted, the gases escape easily and uncontrolled, into the atmosphere, and the rich juices of the heap, so to speak, drain through the mass, and lie either in noisome puddles around and near the heap, or drain away into some neighbouring ditch or roadside drain. Nor, although the system of making manure in open yards, allowing it to lie for weeks, is a little better than the above, is it much better?

especially where no means are taken to carry off the liquid which drains to the bottom into tanks or cisterns. Such modes of dealing with manure owe their existence to gross ignorance of what farm-yard manure is, and how its constituents "behave," as the scientific phrase is. Some of those points we shall, in other papers, probably refer to, meanwhile we proceed to consider very briefly some of the effects of exposure to rain, &c., on manure. Some would seem to think that the quantity of rain water which falls upon the surface of a manure heap, or manure lying in open yards, is no great matter. One, however, has only to consider that the rain-fall in this country is in nearly every district very great. Thus one series of observations shewed that the average weight of water, in tons, per acre, was over one thousand tons; as passing, or filtered, so to say, through the soil. Now, the number of square feet in an open court-yard is very considerable, and the amount of water draining through the manure will also be considerable. The same may be said of an open dung heap, although, of course, in a less degree, from the less surface which it presents. Now, the rain in filtering through the mass must carry away with it a certain portion of the valuable constituents, and if water, along with these, is allowed to filter through the

soil on the bottom of the court-yard, and be lost, then it is evident that a loss is sustained. That the drainage water from manure is valuable, will be evident from the following:—Thus, in one case, in 1 gallon there were no fewer than 15.13 grains of ammonia, 716.81 of organic matter, and 625 of ash; in which ash there were 73 grains of phosphates of iron and lime, 60 of carbonate of lime, $14\frac{1}{2}$ of sulphate of lime, 10 of carbonate of magnesia, 297 of carbonate of potash, 70 of chloride of potassium, 102 of common salt, and 10 of silica. When we calculate by tons, in place of gallons, the loss from drainage from large surfaces of manures must be very great. But

this is not the only source of loss by allowing the manure to be exposed; we have the blanching effects of the sun, the evaporation caused by heat, and the effect of winds. That evaporation in summer time is very large may be gathered from the result of one observation, when it was found that nearly 1200 tons were evaporated in the six spring and summer months—April to September; in winter, the weight was only one-third of this.

All these facts point to the best mode of keeping farm-yard manure, namely, under cover. Of which system we shall have something to say in the following article.

FARMYARD MANURE—COVERED AND UNCOVERED.

IN the preceding article under the head of "Farm-yard Manure, How best to keep it," we had some remarks upon the loss sustained by exposing farm-yard manure to rain, sunshine, and the like, and concluded by stating that the best mode was to cover it. We now proceed very briefly to shew some points connected with the value of covered farm-yard manure. The point involved is stated broadly by one of the very best authorities in this country, when he puts the value of manure made under cover as "fully one-third stronger than that which has been exposed to the rains of winter in open yards." The same authority, in answer to the objection that covered-made manure is apt to become mouldy and dry, states that it does not become bad, for this simple reason, that the fertilising salts which are washed out by rains from manure exposed to the atmosphere, are retained when it is made under cover, and, consequently, the moisture is also retained. But, we might ask, for this reason why manure made in open yards should become mouldy and dry? The answer is, that in a covered manure-pit or in a liquid manure-tank should be formed also at the same time, the contents of which must be pumped up at intervals

and over the manure in the pit; all excess of liquid being allowed to run back to the tank. In a succeeding article we purpose giving the illustration of a dung-pit and liquid manure-tank we have recently constructed on this principle of operation.

Although the subject has not yet been so fully and practically investigated as its importance deserves, and which, we do not hesitate to say, should have been done before this time by one or other of our leading agricultural societies, still, we have at command the result of one or two investigations which have been praiseworthy made by private individuals. In one of these, that of Mr Scot Skirving, the produce obtained from manure made in a covered court, was over one-sixth more than that obtained from manure made in an open court. The crop grown was potatoes, of the variety known as Regents, and the manure in both instances was applied at the period of planting; the weight per acre of each kind being precisely the same, namely, 20 tons; the soil being in both experiments as nearly of the same quality as could be obtained. In an experiment where the crop was wheat, Mr Skirving found, that while the produce of the

plot under the manure made in an open court was 30 bushels, that from the plot with manure made under cover was 35 bushels. We could quote other facts in proof of the value of manure made under cover, from a fertilizing point of view, if space permitted; but we would here refer to another point in its favour, namely, the ease with which it is managed. For when made under cover, the quality of the manure is not only richer, but of such uniform quality, that the necessity for "carting it into heaps, in order to ferment it down into a uniform mass," as is generally done, is obviated. Besides, as the authority we at first quoted says, it is ready for use when wanted in the field, and being quite protected from all atmospheric influences, it cannot be

deteriorated in quality by waiting till it is wanted. Moreover, all expenses involved in working the manure in heaps is saved.

As to the expense of making covered yards, it has been estimated that for 5s. each superficial yard of ground may be covered in. This, however, with the present price of materials, and rate of artisans' wages, is rather low, and the price may be put down at from 6s. to 7s. per yard. Much will, however, depend upon the style of erection adopted. There are cheaper modes of building than those usually adopted, and by the judicious use of iron, and one or other of the cheap roof coverings, to be easily had, we believe that a much cheaper structure could be obtained than is usually put up.

ON THE IMPORTANCE OF GOOD SEED FOR THE GROWTH OF GRAIN.

BY PROFESSOR JAMES BUCKMAN, F.G.S., F.L.S.

BY good seed is here meant proper well-developed seeds, as opposed to badly grown immature starvelings, or seed of bad stock and poor quality.

That the farmer should ever sow these latter ought to be a matter of surprise, seeing that in the breeding of stock he is careful in selecting what will best suit his purpose; and the henwife in setting her eggs would not choose the oldest examples for the purpose, nor would she set eggs of sorts she did not approve.

Now the analogy between the egg and the seed is much closer than at first sight one might imagine. We will only suppose, for the sake of argument, that we separate the poorest seeds from a good stock for the purpose of sowing; can we possibly expect the best results? And yet this is what hundreds of farmers are now preparing to do with regard to the forthcoming barley sowing.

But, further, let us suppose a well-grown sample of barley, where the grains are large

and plump, but yet, by reason of exposure, after being cut, to a fortnight's rain, is mildewed and sprouted. In this case, not being fit for the maltster, how much of it will be considered fitted for seeding purposes, farmers being too slow to understand the fact that such barley as malts best, is at all times the best for seed, the healthy malting process being but a commencement of germination in healthy and good barley.

In order to shew that this is not a mere theoretical matter, we proceed to give the results of some experiments on the following crops. 1. Oats; 2. Barley; 3. Wheat.

1. *Oats*.—As a rule, we have found farmers exceedingly careless in their choice of seed for this crop. Good oats, according to sorts, may range from 40 lb. to 50 lb. per bushel. Anything below the lowest of these figures we should consider a degenerated example, and it is quite in accordance with our own experiments that the sowing of these should result in a still greater degeneracy. In fact,

the result of our oat sowing may be stated as follows :—

In 1865, we sowed part of a field with white Canadian oats weighing 48 lb. per bushel, the resulting crop weighing 47½ lb. In the same field were sown some black Tartarian oats weighing 40 lb. per bushel, our crop weighing only 38 lb. per bushel. In 1867 were sown some white potato oats weighing 48 lb. per bushel, the crop being very large considering the light sandy nature of the soil, and the weight of the crop was equal to that of the seed. Our own seed of these oats was employed for 1868, but the weight of the crop was 48½ lb., a defalcation partly due to the season, partly to the want of change of seed.

Some few years since, we set to work to ascertain, by experiment, whether the wild oat (*Avena fatua*) was the parent of our cultivated forms; and on sowing the seed of the wild and treating it as a crop plant, we soon found that some of the examples grew larger and heavier seeds than others.

These heavier seeds were selected for the purpose of carrying on the experiments, and following out this plan, on about 8 acres we obtained some very respectably grown oats, estimated at nearly 40 lb. per bushel; whereas from 15 lb. to 20 lb. would be good weight for a bushel of wild oat seed. These experiments, then, not only shew us the importance of *selection* of seed, but they confirm views often expressed by the farmer, but not believed in by the naturalist—namely, that in some situations they were afraid to grow oats as a crop lest they should degenerate into that direful weed-pest, the wild oat. If, then, we can, by selection and cultivation, advance the wild oat to the cultivated type, by allowing the latter to grow wild, it may again revert to the wild type. Practically, therefore, the most highly developed and heaviest oat seeds should be employed for the most successful growth of this crop.

Barley.—We are always struck with disappointment at the samples of barley that are offered at market for seeding purposes. If the sample be at all bright in colour, the grain is sure to be thin, long-ended, and of

meagre weight, the tale being that “it is from a cold country, and it will make a good change.”

Another sample constantly presented to you will be a plump, full-sized grain of barley, but with a colour as blue as a whetstone, and a smell by no means agreeable. About this we shall be told that “it certainly did get some wet, but there’s little of it but what will grow.” If we examine into the merits of these two kinds of seeds, we shall find that a long lean barley from a cold poor district, will often give satisfactory results in a warmer country; but too often we shall find that this thin barley is but a screening from a better sample, in which case disappointment may be expected to follow from its use anywhere.

As regards weathered samples, there can be no profit in their use, as it will be found that from 15 to 30 per cent. will not germinate. We last year saw barley sown, 30 per cent. of which was dead. The farmer, however, used a sack an acre, but the resulting crop was not good, and seldom can be so from such bad seed, as there is too much reason to think that where so large a percentage is destroyed the bulk must be more or less injured.

In barley-sowing we choose the most perfect and even sample for seed, carefully screening out all thin and pinched grains, as being good food for pigs, but useless as seed, our theory being, that a good malting barley is the cheapest and best for seed. It is the cheapest, because one-half the seed usually sown is sufficient; and if it germinate well in the malting process it will do so in the field. At the same time, we confess that samples are to be met with that do not take the eye of the maltster on account of some slight amount of stain. These we should not hesitate to sow, provided on experiment we found them to germinate to the extent of from 90 to 95 per cent.

3. *Wheat.*—We find in respect to this crop great carelessness as regards seed; and it is not a little curious to find that an advanced price is always put upon corn seed, while the sample is often dirty and imperfect.

we have had samples sent home undressed, containing seeds of *Galium agrostoides* (corn cockle), and other weeds, mixed with starved, broken, and diseased seed.

Such seed, besides having a large percentage perfectly useless, always required to be dressed with extra care for the prevention of blight.

It is now well known that by a careful selection of wheat for seed a pedigree wheat of excellence can be obtained; and it has been asserted that these carefully selected seeds not only all germinate, but make plants with a strong constitution, so that even a tenth part of the seed usually sown is sufficient to produce the best results.

Without stopping to inquire into the truth of these views, we are still ready to assert, as the result of experience, that the most profitable principles of any and every particular kind of agriculture are the best and cheapest to employ; and the fact that farmers always prosper more when the seed is middling, shews

that, with a good grain, much thinner seeding than usual may be practised.

In 1867, we sowed in the same field on the 15th October two samples of nursery wheat—Plot 1, six acres; Plot 2, two acres.

Plot 1 was sown with a fair market sample of seed; Plot 2 with the smaller seed sifted from such sample; both at the rate of 7 pecks per acre. Now, it will be seen that as regards the latter we must have sown a great many more grains than in the former, yet the ascertained yield for the two was as follows:—Plot 1, eight sacks per acre; Plot 2, six sacks per acre. We commenced reaping on the 8th August.

From abstract reasoning, then, as well as from the results of experiments, we feel perfectly convinced that well grown, fully developed, and largest crops of grain (other things being equal), are to be expected, as the result of care in the choice of seed—just as much so, indeed, as in choice and selection for breeding animals.

ON THE MANAGEMENT OF SEEDS.

BY CUTHBERT W. JOHNSON, F.R.S.

THERE is perhaps no portion of the labours of the agriculturist more difficult than the management of his seeds. Here, indeed, he has to encounter not only nature, but also the insect world, and last, but not least, the frauds of the unprincipled dealer.

To protect the cultivator from the effects of the two first—Dame Nature and the dealer—no efforts of the Legislature have been made; and against the frauds of the dealer, our Parliament, in its last session, has passed an Act, the profitable results of which we can determine. It may be useful to refer to these things at this period of the year, when the great wheat crop is preparing.

The interference of Dame Nature is the subject of

most constant and universal. The agriculturist prepares his lands; he cleanses it from weeds; he sows his seeds. These in due course germinate, and the crop appears; but with this also come to the surface a variety of little plants, weeds that the landholder did not invite, but whose seeds nature strewed over the soil; in many cases, too, in a manner which utterly puzzles us to explain. Thus, in most soils, if bone dust, or some other phosphatic manure, is copiously applied to the land, or on the site of a fire of wood, a mass of white clover speedily makes its appearance. In other cases, after a fire, as in the great fir woods of America, the poplar springs up in abundance. After the fire of London, the sites of the ruins became tenanted with

and perhaps thousands, of acres grown, and in that whole district you hardly see a barn."

We have also to contend with the miserable result of growing seeds on land abounding with weeds.

Evidence was produced before the same Committee against as well as in support of the Bill. Mr Henry Cutler, of the firm of Cutler & Barker, was opposed to the danger to which his firm, one of the largest in the Seed Trade, would be exposed by selling adulterated foreign seed in utter ignorance of their composition. Only a solitary witness, however, stood forth to defend the adulterators. He was warmly in favour of the use of adulterated seed; he thought it prevented the ill-effects of thick sowing.

The last and most readily avoided source of injury to the farmer's seed is by the professed adulterators. The operations of these were well detailed by Mr C. Sharpe, of Sleaford.

The amount of doctored seed, and the object which is attained, was described by Mr F. Kennedy, of the firm of Thornton, Kennedy, & Co., of the Borough of Southwark.

As to the amount of clover seed sold in the United Kingdom, Mr Kennedy could

only make an approximate estimate; he thought it might be about 15,000 tons, and that from 1000 to 1500 tons of this is doctored in London by two establishments.

The estimate of Mr Kennedy is probably rather under the fact; for in the year 1868, 264,878 cwt. of foreign clover seed were imported; of flax and linseed, 1,635,528 qrs.; and of rape seed, 356,884 qrs.

On the 19th of July 1869, the Committee made their Report, and a Bill was subsequently passed, intitled "An Act to Prevent the Adulteration of Seeds."

The Legislature has, therefore, made a law, from which my readers will, I trust, derive material benefit. But it is idle to conclude that any Act of Parliament can entirely prevent the results of careless seed growing, and of rascally dealers. Against purchasing seeds mixed with the seeds of weeds, the farmer can, to a great extent, guard himself. From acquiring adulterated seeds, however, there is but one safe course, viz., to stipulate for *net* seeds, and to deal with only first-class firms. If the farmer will be tempted with seeds or manures, because offered at a far lower price than that at which an honest dealer can *purchase* them—why, then, he must be prepared to reap the reward of his thoughtlessness.

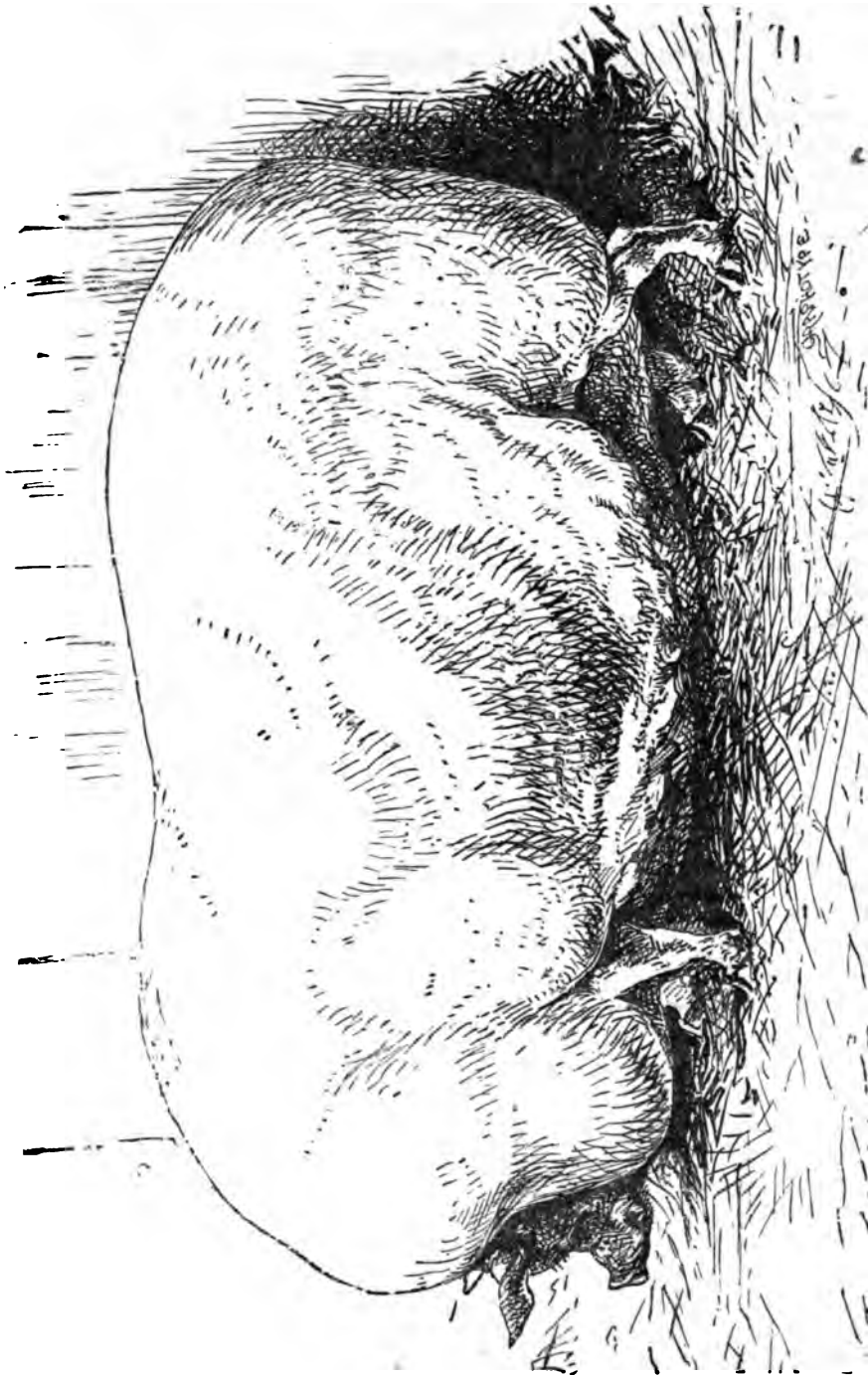
Smithfield Club Prize Animals.

NO. 3.—WHITE BREED FIG.

WE give an engraving of the first prize pig in the white breed section, above nine and not exceeding twelve months old, exhibited at the Smithfield Cattle Show. This animal is only ten months and fifteen days old (at it was so on the first day of exhibition, December 6, 1869), and was bred by John Lynn, of Church Farm, Stroxtan, Grantham, to whom the highest credit is due as a good feeder. Indeed, it was a matter of wonder to the visitors of the Show, how Mr Lynn "succeeded in stuffing him so well" in so short a time as his pedigree indicates.

The animal was fed on barley and peameal, oats, milk, and Beach's farinaceous

In addition to the prize of £10, Mr Lynn received the Club's silver medal as breeder of the first prize animal in the Pig classes. The list of live weights published by the Club is confined to cattle and sheep, the pigs not being included. We are consequently left in the dark as to the weight of this animal. We trust in future the weights of the pigs will be included in the published list.



FIRST PRIZE PIG OF THE WHITE BREED—DRAWN BY HARRISON WEIR.
Bred by and the property of Mr John Lynn, Stroxton, Grantham.

TOWN SEWAGE—WHAT IS IT?

the nature of the arrangements for town drainage, which in our paper of the 11th of June, under the title of "Town Drains and Country Drains," we previously glanced at, gives, of course, as a result, a vast quantity of water mixed with the manurial agents which pass along with it. This, therefore, in some way or other, affects the value of the manurial agents. A glance, therefore, as to how the value is made up will be useful at the present time. Mr Lawes, the well-known agricultural chemist, taking it as granted that the chief source of the valuable fertilising elements of town sewage are the excreta of the population, estimates that, taking all together, male, female, and of all ages, the average amount of solid matter passed by each individual is 2 ounces per week. Professor Way estimates it at $2\frac{1}{4}$ ounces, containing 36.100ths of an ounce of nitrogen. The value of a manure is now generally estimated by the percentage of nitrogen it contains; urine contains the most nitrogen, of the human excreta. Dr Parkin

estimates that each individual passes, on the average, $2\frac{1}{2}$ lb. (2 pints) of urine daily, and 912 lb. in the course of the year. As this liquid contains 3 per cent. of nitrogen, according to Baron Liebig and other chemists, each individual would thus furnish 27.36 lb. of nitrogen in the course of the year. Now, 3 cwt. of guano is sufficient for an acre of corn land; and as this contains, on the average, about 8 per cent. of nitrogen, the above quantity would give 27 lb. If in the same proportion, each individual would be able to fertilise an acre of corn land. The excreta of 10,000—the present population of Great Britain—therefore furnish sufficient manure for 1000 acres.

Neither the solid nor liquid excreta form the principal ingredients of town sewage in its present condition, but they are mixed with a large proportion of drainage water, the surface water from the streets, which tends to dilute it, and correspondingly reduces its manurial value. On the other hand, the value

is somewhat increased by the soot, dung of horses, &c., which are swept off the roofs of the houses and the streets by the rain, and fall into the drains and sewers. Taking it, however, in its normal or ordinary condition, the value of a ton of town sewage may be set down at twopence. In stating the price of Peruvian guano to be from £12 to £14 per ton, we give the extremes of manurial value, and in the price of farm-yard dung at from 3s. to 5s., the medium value of our chief manurial agents. But we shall see, as we proceed, that there are other circumstances influencing the value of town sewage; meanwhile, we proceed to detail, as briefly as may be, some other points connected with it in its normal or usually obtained condition. Made up as town sewage is, of every description of animal and vegetable matter, with certain mineral constituents, all of which are obtained from our domestic houses and manufacturing establishments, and the *détritus* from our streets, it is obvious that its value must be of a varying character, from the varying nature of the sources from which its constituents are derived. The sewage of to-day gives no index as to what the sewage of to-morrow may be. Nay, further, one part of a day gives from our sewers matter of a different value from what another part of the same day will afford. True, the average of a certain number of days may be depended upon; yet there are circumstances modifying even this, so that the ever varying nature of town sewage must be taken into account when considering its agricultural value; for although our staple manures, as guano, farm-yard dung, do vary, still they do not do so within such very wide limits as town sewage. Another point influencing the value of town sewage has only been glanced at, namely, the quantity of water passed into the drains. It is obvious, that in places well supplied with water, and the sur-

plus or waste of which is passed off to the drains by the *media* of perfect hydraulic appliances, the sewage of such a place will be of different value from that obtained from a town less liberally supplied with water, and the arrangements for the passing of which into the drains are more or less incomplete. Taking a fair specimen of sewage, we find that it

is composed first of matter held in solution, of which there are 19.75 of organic, and 57.29 of mineral constituents; and, second, of solid constituents, made up of 30.70 of organic, and 72.15 of mineral matter; third, of suspended matter, of which 10.95 were organic, and 14.90 were mineral constituents.

A CHAPTER FOR FARM LABOURERS.

AMONG the many periodicals that we receive from America, there is none which we peruse with greater pleasure than *Hearth and Home*. It is well printed, on a sheet the same size as the *Illustrated News*, and is illustrated with engravings of a high class. The greater portion of the paper is devoted to agriculture and horticulture, and considerable prominence is given to rural architecture and the laying-out of villa gardens. The remainder of *Hearth and Home* contains common-sense practical articles on household management and domestic economy. One or two tales, and a column for boys and girls, complete the programme of this journal, which, so far as the domesticities are concerned, has certainly no rival either in our country or America. We heartily wish it the success it certainly deserves.

As a specimen of the thoroughly practical nature of its articles, we have selected the following, which is worthy the attention of the families of our farm labourers, as there are many waste bits of land in this country which might be turned to a profitable use.

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times he earned a chunk of salt pork and a pillow-case of meal by chopping or ranking wood for charcoal. His wife went barefoot, and spent the month of August in the huckleberry swamps. A fever sore had destroyed his right leg when he was a boy; and partly out of pity, and partly to help him to keep above beggary, the neighbours had thrown in and made a slender purse, sufficient to buy a wooden leg for John. Mr Webb is now not only forehanded, but opulent. Nay, he is a magnate in the pines, and loans money right and left, taking notes of his richer neighbours, and settling a well clinched mortgage on the farms of those less fortunate. But he still lives on the edge of the swamp, for that dismal little morass has been converted from a frog-pond to a mint, and every year he takes from 5000 dols. to 10,000 dols. worth of produce from a sour, cold, mossy, grassy surface, 10 acres in extent.

Not long after the donation of the wooden leg, John began to thrive. He and his wife picked all the wild cranberries they could find nestled in the moss or hid beneath tufts of coarse grass and cat-tails. Some years they gathered as many as 30 bushels, and John would drag them, pile them into a rough little cage behind a sorry horse, and drive his four-wheeled load through dull sandy paths, westward thirty miles to Trenton. The merchants gave him a dollar a bushel, and he generally took pay in store-truck, &c. Soon he made a practical observation, that, acted upon, has

his fortune and added great wealth to the region in which he lives. He noticed where the sand was washed by winter or summer showers, from the sterile of the swamp, and settled over the ry-vines, they bore better. So he a wheelbarrow, and commenced work, helping him sometimes at the spade, sometimes at the handles. The more he l sand over the bog, the more he ben sand as the proper top-dressing for traordinary vine. In other respects d nature, fighting the grass with a hoe gh, grubbing up the bilberry-bushes e dwarf cedars, and making ditches. e gathered an apronful of cranberry- where they grew thickest, and followed the spot where the vines were thin. lld punch a hole with the end of his leg in the soft black soil: she set a the drill thus made, and with a press foot embedded it. By thrift of this ir crops increased apace, soon yielding oo bushels, then 200, 500, 800, and This year he thinks the pick will not than 2000 bushels, and those good at ; say 2500. Another marvel about unalous berry : price grows as the supply enlarges. ob for years was glad to get a dollar. merry when they brought two dollars, en, as now, the price ran up to four t was no longer a question of bread k, but how rich he could grow to be. /ebb had a few feeble imitators, but s did not grow for them as they would

Some joked and said none but a -legged man could raise cranberries. imagined there was some magic in the ule at the end of that stump with e punched the holes. In 1862-3, nd Daniel Gowdy, taking with them ampbell, a marketman in Philadelphia, an old saw-mill site at Holmansville, son township, five miles west of Bricks- id began to put in a bog, as the cran- rden is improperly called.

water standing over a surface of 20 or ; for half the year, had killed most of e timber, and their labour was mainly

limited to ditching, digging up, and carrying off the scalp or shock of coarse grass, weeds, reeds, and bushes. This done, they embarked in what seemed to all the people of the vicinage, a crazy enterprise. They laid a rude track, and spread all the soft, black surface of the muck with a top-dressing of the whitest building sand that a most arenaceous surface afforded. They made it 3 or 4 inches thick, and, after levelling and laying off, put out the vines at regular intervals. People called it the "Pine-woods Folly." The upper end of the track is owned by Frank Todd, a part of whose plantation is now five years old, and the rest three, two, and one year in. On the three years' bog, three years this fall—that is, only two summers' growth—we measured off 1 square rod, and from it 2 bushels and 3 pecks were gathered, the rate being 440 bushels per acre. Another square rod yielded 3 bushels and a peck, the rate being 520 bushels per acre. Of course, the Messrs Gowdy and Frank Todd have the cranberry-fever. All their spare change is paid out for ditching, scalping, sanding, and throwing up the dam. Mr Todd has 40 acres now undergoing the sanding process. And here we may remark that Mr Todd has been entirely successful in practising a near cut in this business, which saves him about 100 dols. an acre. Last July he tried the experiment of sanding without scalping, spreading the sand upon a rank swamp growth. Vegetation was thoroughly killed, but he thinks his success is due to the fact that he overwhelmed the exuberant vegetation in midsummer and during a rainy spell, so the grass soured and rotted beneath the hot sandy jacket. Where there are no big trees or stumps to remove, a bog can be put in in this way at a cost of 200 dols. per acre, not counting the dam. The expensiveness of the dyke depends on the slope of the surface, and the width of the bottom or swamp. The fame of such unwonted profits as the cranberry gives in South Jersey and Eastern Massachusetts, has extended to all the paper-reading public, and editors are often pelted with interrogatories from Minnesota, or Arcadia, or Alaska, or North Carolina, asking about the cranberry.

We close this article with a body of instructions, so full, yet closely packed, that whoever is so fortunate as to read this number need not clamour for another spoonful of cranberry sauce :—

1. *The Cranberry Soil.*—Two sorts of land are found appropriate to this vine—the savanna swamp and the cedar muck-swamp. They differ rather in degree than in nature. The savanna bog has black sour swamp-muck, mixed with sand. In the cedar bog there is little or no admixture of sand, the peat being alike in all parts of the bed, black and sour, varying in depth from 1 to 6 feet. A savanna bog is more easily put in, but is not so sure as the other, and in a great number of cases they have not been successful. In fact, John Webb has much the best bog of this description in the country.

2. *Cost of Establishing.*—Where a cedar bog has many stumps and fallen trees in it, and the fall requires a dyke of considerable length, the proprietor will use about 400 dols. per acre before he has many bushels of cranberries to sell. On the other hand, it is doubtful whether Mr Webb has spent over 50 dols. an acre on his cranberry meadow. The average of the expense would be found to fall at about 200 dols.

3. *Time Required.*—If vines are set out in the fall, in the following fall a few may be gathered. The next year, a crop of 25 or 30 bushels per acre may generally be expected. On the third year, a full crop rewards the enterprise. By a full crop is intended from 150 to 200 bushels per acre. The average over all bearing bogs in a good season is about 100 bushels.

Vine Treatment.—A bog needs some special treatment in the fall. It should be matted with straw or brush, and the vines should be cut down. In the spring, the vines should be cut down again, and the bog should be matted with straw or brush. In the fall, the bog should be matted with straw or brush, and the vines should be cut down. In the spring, the vines should be cut down again, and the bog should be matted with straw or brush. In the fall, the bog should be matted with straw or brush, and the vines should be cut down. In the spring, the vines should be cut down again, and the bog should be matted with straw or brush.

age in which it is marketed costs 20 cents; but John Webb makes his own boxes of winter evenings and rainy days. The lumber used may be worth 5 cents. For some years the price at which the bulk of the cranberries is sold is 4 dols. Late in winter, they often command 5 and 6 dols. The abundance of other tart fruits, of course, affects prices.

6. *Extent of the Business.*—There are but two regions where the requisites for the vine are frequently met; these are a cold, sour bog, and sand convenient and abundant for top-dressing. These conditions are found in Eastern Massachusetts and in South Jersey. But the business is in its infancy. Not more than six or seven hundred acres in Ocean county, the chief county for cranberries, are in good condition and full bearing; though two or three thousand acres are nominally in cranberries. The price of wild lands suited to their culture has enhanced from 15 dols. to 50 dols. per acre, though swamps in remote places can be bought for 20 dols. and 25 dols.

7. *Enemies of the Cranberry.*—Worms of two sorts, and grasshoppers. The worms can generally be drowned without injuring the vines or berries. The grasshoppers can be utilised by feeding them to turkeys. Hereby hangs a tale. An energetic boggist below Manchester found his vines set upon by myriads of grasshoppers. Straightway he became a purchaser of turkeys, young and old till he collected 125. For experiment, he kept them penned one day and fed them on corn. They ate 3 bushels. Then he fenced his bog and made a turkey range of it. They devoured the grasshoppers and fattened fast. So now he has 125 fine large birds, whose keeping so far from costing anything, kept him free of grasshoppers, and gave him a good crop. The result is, that any person who has an enterprising Jersey farmer can be treated with roast turkey and cranberry sauce.

Note.—The cranberry here alluded to is the large-fruited American cranberry, *Oxycoccus macrocarpus*—regarding the properties and

ation of which several articles have appeared in the columns of *The Farmer* newspaper. The American cranberry is vastly superior to either of the European kinds, *Urtica palustris* and *Vaccinium Vitis-*
Experimental trials have shewn

that it is quite suitable for the climate of Great Britain; and seeing that we have large tracts of otherwise worthless ground where it might be expected to thrive well, it is a pity that none have yet grown it on a large scale.—Ed.]

FARM AGREEMENTS.

BY R. H. MASFEN.

[A Paper read before the Central Farmers' Club.]

THE first consideration must, as a matter of paramount right, be given to the owner of the soil, such a manner as is least likely to prejudice the interest of the occupier, extending to the one security investment of his capital, and to the other an assurance that the property shall not be depreciated by an incongruous act of an unscrupulous individual, or by misfortune or otherwise, might be disposed of in a manner at variance with the recognised customs or principles of good husbandry. In introducing this subject to your notice, you are well aware it is not its novelty that caused the Committee to take it, neither can I plead ignorance to some of the most striking features which, at this time, seem to be drawing the attention of the agricultural community; for, during the last few years, it is a rare circumstance to take up a paper where you do not find various agricultural bodies have been discussing the same subject we are met together to propound this day. The mere relation of landlord and tenant implies an implied obligation on the part of the tenant to manage a farm in a husbandlike manner, according to the customs of the country where the premises are situated, unless the lease or agreement contains some special covenant or promise inconsistent with such customs, and sufficient to exclude them.

ARBITRATION OF DISPUTES.

It is extremely difficult accurately to state the customs prevailing in different counties, and it is more difficult in practice to determine to what those customs are, or are not, inconsistent with special stipulations in agricultural leases or agreements.

All disputes should be submitted to arbitration, and settled in the usual manner—the customs prevail, and the express contract prevails. The tenant should be both agriculturally as well as a good tenant. Litigations on agreements and customs are best controlled by mutual arbitrations between outgoing and incoming tenants, and by the adoption of numerous stringent and compelling clauses, which are now too frequently used, but are of little or no practical value. I

often hear expressed that a good understanding between landlord and tenant is an antidote for all ills that may arise between them. No one more highly values the advantage of that good understanding; but that is not all that is required. In how many cases is a considerate landlord succeeded by a spendthrift son, or his trustees? or what guarantee have you that the property on which you are placed may not for a hundred reasons change owners? It would not be necessary for me to give illustrations of the great hardships brought unintentionally upon old tenants by their landlords, in ways the least apprehended by either party, or by circumstances over which they had no control.

MUTUALITY OF INTERESTS IN THE PROPRIETOR, THE TENANT, AND THE LABOURER.

In the compiling of agreements, one fundamental principle must alone be recognised—the owner, the occupier, and the labourer, each receiving the consideration due to their respective positions. The owner of the soil is entitled to paramount consideration, which should not be entertained to the injury or disparagement of the others; for, be it remembered, that an amount of obligation is also felt by the farmer in a degree which the circumstances of the case demand. The laws of property extend protection to the one, which the other does not enjoy: hence we are naturally led to ask, What is the corresponding amount of capital which a tenant, who is subjected to a six months' notice to quit, has embarked in the occupation, as compared to the relative value of the fee simple of the land? Statistics are not palatable to those who listen to papers of this kind, and tend frequently to embarrass the introducer of a subject, let his information have been derived from the most reliable source. Mr Mechi's statement of the amount of capital required to farm well and profitably, goes far into the subject before us. As an illustration of the position necessarily existing for better security, if £15 per acre is required, it is one-third the value of the fee simple of the average land of England. The owner, the occupier, and labourer, are so identified, that any assistance given to the one is appreciated by the other, as tend-

and I trust I may never be found backward any and all the assistance in my power to remove of the trammels which tend to impede its progress. The agriculture of this kingdom has during under a transition state during the last years, as we know by that period's experience great changes have been brought upon us, which the laws of nature had, like ourselves, no

cal economy has brought us to a widely different of things to that preceding the repeal of the laws and Sir Robert Peel's Bill permitting the importation of foreign live stock. The principle or uncommodity with many farmers was *wheat*; but the reduction in its value, caused by the great importations of foreign grain, his attention is naturally turned to another source of profit, viz., the production of another amount of animal food and wool. The circumstances of the case, and the necessity for the employment of a large amount of capital in the importation of land, render many of the agreements now, and have been in force, a clog and a hindrance to that full development of the power of production from our own native soil which the ever increasing population of this country demands. The small number of live stock, and the enormous cost of artificial food and manures now used, the expense of improved machinery being necessary for the production of the same, render that investment unprofitable. The great obstacle to the improvement of general agriculture of the country being, as I stated, the absence of capital, is, I fear, too frequently encouraged by the number of applicants for loans and the unwillingness on the part of the agent to put more fully into the means at the disposal of suchious applicants.

are often reproached for not bringing more of the commercial element into agriculture, and with the degree of force it can be said we are to blame; the position varies materially from the position of rural men. If a business in one place does not suit his purpose, he can, with little loss of capital, go somewhere else; but when a farmer invests, he runs a great risk of losing considerably by the same. Hence it is that other arrangements are unprofitable for the amelioration of our class. The isolation of the agriculturist must ever be a disadvantage to him. Before the introduction of railways we had few opportunities for the interchange of ideas; this I view as our misfortune, not our

now nearly thirty years since the originators of the system, who were fully alive to the disadvantages which they were labouring, determined upon the experiment of these gatherings, the success of which went to all. In taking a financial view of the relative difference in the expense of assembling a group of gentlemen of our class in this room, and an equal number of the citizens of London, at any given time in their own city, to discuss their general inter-

ests, I think the position of the one will compare more favourably to the other than the outer world are disposed to extend to us.

MR CADLE'S PRIZE ESSAY ON FARM AGREEMENTS.

In the year 1868, the Royal Agricultural Society offered a premium for the best form of agricultural agreement, or an essay upon the same; and the gentleman who took the prize gave us a form of agreement which met the views of the Council more fully than any other—and I do not think I can proceed better than by laying before you some of the clauses introduced therein. The Royal Agricultural Society, in awarding this prize to Mr Cadle, recognise by their act the existing necessity for more liberal covenants. When we consider the importance of that Society, and the position held by those gentlemen composing its Council, I think it must be apparent that a great object is gained, from the fact of such an agreement appearing in its Journal. I do not know what competition there was for the prize; neither is it necessary that we should be acquainted with that fact. The recognition of the necessity for an agreement, in accordance with the altered circumstances of the times, and an endeavour to remove the trammels so often introduced, which prevent the utmost development of the soil, and the acknowledgment of the principle that it is necessary to give the same protection to the capital invested in the occupation that is afforded to the owners of our broad acres—this recognition I consider by the representatives of the first agricultural society in the world (when we know that in the constitution of that body over 70 per cent. are either landed proprietors or their representatives), *should carry* a weight with it, the effect of which must be felt far and wide if they earnestly assist in carrying out their recommendation. I do not know how far my views may be endorsed by the members of this Club, but if the motive power of the Royal Agricultural Society will assist in carrying out the revolution proposed in Mr Cadle's agreement, I think we have grounds for hope that a point is gained, and we shall soon find a better system than the present unsatisfactory mode of meting out justice to quitting tenants. Although the successful competitor is a stranger to me, I have had much satisfaction in reviewing his essay, and can distinguish the practical knowledge of the writer. He tells us it is compiled from various sources, and embodies the best part of Lord Lichfield's agreement, which he considers as complete as any he has seen. I have much pleasure in referring to the name of that nobleman, feeling sure there is no one who knows him as well as I do, who will not feel that any improvement introduced by one so desirous to ameliorate the position of the British farmer, should receive that amount of consideration at the hands of the landowners generally which this great question deserves.

It will not be necessary for me to go *seriatim* through the various clauses introduced in Mr Cadle's essay,

but merely to refer to some of the principal parts where a difference of opinion may arise, and where anything so completely opposite is proposed to anything now in general use. This agreement sets forth that the straw, hay, &c., all belonged to the landlord, and that the hay, straw, fodder, and roots of every description be consumed on the farm, except that certain quantities of hay, straw, and roots may be sold, the full value being returned to the farm in the shape of cake or artificial manure. Now, this is a boon now generally given to farmers, and the great waste you frequently see of straw, where a tenant is compelled to consume it all, is such as to render it little better than rotted straw, returning nothing fertilising to the land for succeeding crops. Referring to the sale of hay and straw, returning the value to the land in purchased food and manures. Railways have done much to render this desirable, finding a ready market for the production of the farm, and the facility for returning the elements for greater productiveness. Another clause not generally found is, that a tenant may sow two white straw crops in succession; now this, I think, will be advantageous in many localities, and not injurious to the land; it has been so in my case, having frequently found a great difficulty in the growth of clover, and in each case, when I have adopted the second white straw crop, preceded by a liberal application of manure, the result has been a satisfactory root of red clover.

Mr Cadle proposes compensation for artificial food and manure, and *that* on a liberal scale, and I think it will meet with many supporters ; as far as the *food* is concerned I will go with him, but I am not disposed to sanction his view as regards superphosphates—the last year but one for a manufactured manure. The *last* year in my opinion goes far enough. For draining and all permanent improvements in building, fencing, laying down grass land, and planting fences and fruit trees (the sanction of the landlord for all improvements being given), I fully endorse his proposals, and coincide with his general mode of compensation for the various appliances referred to as the productive elements which a tenant, farming highly, must leave for the benefit of his successor.

In all agreements, the great object to be kept in view is to place such an one in the hands of all men, as to give them the greatest inducement to farm well up to the expiration of the tenancy. The great failing of tenants is, that they have no inducement to farm

any year, half the arable land shall be fit to plant with white straw crops ; one moiety shall have been fallowed with green crops during the previous summer ; the other moiety shall have been wholly under clover or mixed grass seeds, or part in clover, the rest beans and peas ; after being manured, none of the clover or grass seeds being allowed to stand for seed. He requires that not more than one-fourth of the arable land should need to be fallowed in the year after the termination of the tenancy, nor require an outlay of more than £2, 10s. per acre to clean it ; if it required less than that sum, the landlord or the in-coming tenant to pay the difference ; if more, the out-going tenant to pay it. Then follow the compensation clauses : Not less than one-fourth of the clover, or mixed grass seeds, shall be mown for hay during the last year, for the use of, and to be paid for, by the in-coming tenant ; for the remainder of the land, whereon clover or other grasses have been grazed the whole summer by sheep, the in-coming tenant shall pay after the rate of 40s. per acre, provided such land be clean, and that only one crop of corn has been taken since the previous fallow. There are other covenants that relate to the purchase of manures, which are dealt with in the manner proposed by Mr Cadle. With one exception, Mr Randall proposes that one-half of the proceeds of the hay, straw, &c., sold, be returned to the land.

TERMS OF ENTRY AND QUITTING FARMS.

Much diversity of opinion exists on the time of quitting and entry on farms; it is contended in some localities that Michaelmas is a more desirable time for change than Lady-day. It is not general in my locality; but on several occasions I have valued on farms where a change has taken place at Michaelmas, and in those cases I have found it has given satisfaction. In the Michaelmas change one thing is apparent—that the off-going tenant can clear away, and that the in-coming tenant, by paying for the produce, which is then secured, is at liberty to proceed in all matters without hindrance, and carry on the various operations of the farm, which are often very unsatisfactorily performed by an off-goer who leaves at Lady-day. I should here observe that, although I oppose any set rule of cropping, considering it quite unnecessary, I should require the farm to be given up in a certain course, although the valuers would consider a farm up to the required standard of husbandry when a preponderance of any one state of cultivation prevailed. A landlord has an agent, whose business is to attend to his estate, who must keep a schedule of the cropping on each field on entry. All men in charge of estates should be thoroughly practical, who could at once discover any tendency on the part of a tenant to reduce the value of his farm, of which he should remind him; and on a second intimation being found necessary, he should give him notice to quit, and remove him. This would be attended with much more salutary results than requiring him to sign a stringent

nt and farm by it, believing he could do little o the property, when each succeeding year nd him and the land in a worse position than

As a general rule, it is bad for all classes that ld remain. This, I fear, has had more to do peding the progress of British agriculture than re aware. A great landowner and myself have mes spoken of this subject, and on one point we ot agree ; but recently, I am pleased to say, he tertained my views. I always contended an ent should be made to suit a good tenant. He No, there is no necessity for one with a good

They are required to make bad ones farm and against any fraud that might be practised." ily was, "Give liberal agreements, and the r of bad tenants will soon be reduced to the possible point."

COMPENSATION FOR MANURES.

ractical men know how much land is improved aid of artificial food, and the extent of benefit it from a liberal diet to domestic animals. The for invested capital is not expected to be made animals who consume the food, but from the ng properties of the manure ; hence, you see, it of recognition in all farming customs of antient It is now an ordinary thing for men to ex- annually sums amounting to half, or in many o even more than the rent of the land : it is re, self-evident that, under a six months' notice , and no saving clause in an agreement to pro- enant from contingency, it is obvious improve- rust, in a great measure, be retarded. It must imagined that the present occupier is the only nterested in these things ; the landlord also, e in-coming tenant, are equally concerned ; I said previously, I view it as a great national n, and in no other light can I consider it should oduced to the community at large. In some es the manure upon the farm belongs to the ; he pays on entry, and, as a matter of course, s for it on leaving. In that case, there is no gained by lowering the condition of the farm. as a limited quantity of manure on entry, and ; a larger proportion at the expiration of his y, he receives for all additional, and is thus re- nsed for the expense to which he has been at by crease. This is considered by many farmers st form of occupation, and as one of the best of agreements has certainly much to recommend it. er counties there are various customs in general alled compensation for dressings and acts of idry, that find favour as tending to a good state bandry ; the off-going tenant receives compen- for the last year's artificial manure bill, deduct- tain sums for the roots, as per the mode of con- ; them.

COTTAGE ACCOMMODATION.

other most important consideration for the is to see that he stipulates for the provision of

good cottage accommodation. We are often told we pro- vide our cattle with comfortable and warm shelter, but the lodging of our agricultural labourers is not taken into consideration. This is a thing that requires at- tention ; proper accommodation within a reasonable distance from his labour should be provided. The Union Chargeability Act has in some measure re- moved an obstacle in the way of this great good, but there is much still to be done to make the matter as satisfactory as I could wish. Lord Leicester expressed a good opinion upon this subject a few years ago. He told us that in improving the dwellings of the labourer we were not to expect a return for our capital direct, but must charge the additional convenience we receive with some share of the expense incurred, which should be borne by both landowner and tenant ; and in that view I think he would find many of those best able to express an opinion join him. The labourer must be better educated, and with that increased education you fit him for a more elevated position in the social scale, and in no way so well reward him, as in increasing the happi- ness of his own fireside. Education enlightens him, and should make him a better labourer, and that same in- formation makes him more alive to the position in which he has been too much of a reproach to our class and of commiseration by another.

I believe the agricultural labourer of this kingdom will bear favourable comparison with the operative classes generally, still I consider there is necessity for his condition being improved. The requirements of the age make the service he has to perform more intri- cate than formerly. The education of the labourers' children will occupy the attention of Parliament during the next session, and I trust that in dealing with it pro- vision will be made to educate them to the position they are expected to fill ; and if, in addition to their book knowledge, some scheme can be devised for their technical education, an additional object will be achieved. The steam - engine, plough, reaping- machine, in fact, every new appliance for the general cultivation of the farm, is rendered more valuable, the amount of property in the shape of machinery more costly than formerly ; hence, you require a better man, as more intelligence must be brought to bear in nearly every branch of labour in which he is engaged.

GAME.

The next is one of the most difficult questions to deal with in connexion with landlord and tenant, I allude to Game. Mr Cadle, in his agreement, pro- vides for the destruction of rabbits all the year, and for no dog during the breeding season, which is quite right, and with the general stipulation I agree. With regard to compensation for damage done by game, I cannot coincide with the proposal, knowing, from practical experience, the evil attending the clause, viz., "To allow for all damage done by game exceed- ing 20s. per acre for each and every acre so injured," and the delusion it has been to hundreds of tenants, to suppose they are secured against damage (which

apparently they are); but, at the same time, in grasping at the shadow, they too often lose the substance. This is apparently a practical solution of the difficulty, but I fear it is only the beginning of greater differences than at first sight appear. I have frequently been called in to assess damages done by game, and all who have been similarly placed will agree with me that it is surrounded by a variety of disagreeable circumstances. You must first, as per this agreement, submit to an amount of damage, receiving no compensation; you then have to make a claim of a nature not the most agreeable, and no claim is viewed either by a landowner or his advisers with a more jealous eye than the one alluded to. I will ask you, as practical men, in how many cases of this kind have you not found that a notice to quit has followed on almost the very next opportunity after such a claim has been made? If, gentlemen, you have not, I have. When consulted upon matters of this kind, my first question is, Do you value your occupation? If so, do not do anything likely to irritate your landlord, or those in his employ, for it must be well known there are, besides the owner, those who are often fully as difficult to deal with in things of this kind. I believe no greater evil exists than this over-preservation of game. I am sorry to see in many localities a great tendency to that end, the un-English fashion of "battue" shooting finding favour with too many. I should be sorry, indeed, to deprive noblemen and gentlemen of the recreation afforded by the sports of the field; every good tenant wishes, and is proud to find his landlord a good day's sport and happy to entertain him and his friends.

Another most objectionable practice on some estates is, to introduce a second tenant by *setting* the game. This should *never* be done without offering it to the tenant, and if he refuses to have it at the value placed upon it when he takes the farm (which should always be a fair one), the landlord should then be considered at liberty to deal with it as he thinks well. The case of Mr Dickson, tenant to the Duke of Portland, is familiar to many, and the state of things there disclosed, where game was set to a company, and the unpleasantness which ensued; and there are hundreds of cases which I fear are much on a par with it. I look on the whole question to be more completely set at rest by public opinion being brought to bear upon it than anything else. Men and things are more influenced by that than by any other power. The *law* now gives the tenant the game, but by a voluntary act he reserves his right to the owner, feeling, at the same time, he has little option in the matter. But here I could reserve that, in all cases where land is set at a reduced rate for the over-preservation of game, it is only just that the rates should be in the same proportion they would yield if there was not that joint occupation, which arrangements of that kind must be considered. We are now frequently called upon to pay rates for its

protection, adding to our rates by the fact of police being interfered with in their useful work, by being called upon to protect some ardent sportsman's game and assist his keepers. Nothing tends more to fill our gaols and workhouses; and be it remembered that no class contribute so largely to the rates of this country as the occupiers of the land, and with the imperative necessity that exists for producing a larger amount of food for the increasing population of this country, the public require that every obstacle should be removed that interferes with the largest amount of production for their use. It is not well to attack private interests upon public ground; but if there is one question more than another where that is admissible, it is on the subject we are now considering.

Agricultural energy, enterprise, and skill, are much retarded by localities where you have an over-preservation of ground game, and, assuredly, the interests of the many should receive a prior consideration to the pleasure or caprice of the few in support of that system which makes less than valueless some thousand acres of the best land in this kingdom, and compels us to seek food for our teeming millions from sources which could not add so much to our natural prosperity as when it is produced from the sources within our own command. I refer to those instances where there is an excessive preservation. There is one remark I wish to make upon the rabbit clause in Mr Cadle's agreement; it provides for the destruction of them at any time, but there are hundreds of farms where rabbits never remain on the land during the day, although at night they visit you by hundreds, to the utter destruction of your crop. Now, in cases of this sort, the stipulation affords no remedy, you have no power to enter the coverts where these pests of the farm take shelter during the day, and to attempt to interfere there would be considered sacrilege. I know two instances under my own observation where the tenants have great damage done them, and where the privilege of catching is given as stated in the agreement: they both say they could not kill a couple if they were offered £100 for them. In one case a small covert adjoins some arable land, and in three years over one thousand head of rabbits have been shot and otherwise killed in the covert, but not one single head outside. Now where, I would ask, were all the one thousand fed? By whose property were they rendered a marketable commodity?

There never was a time in the history of this kingdom when the question for discussion this evening presented itself to us with the same force as the present. In feudal times, and when men made laws to protect their own individual interests, as of yore, the will and action of the one was subservient to the other, there was then little fear of the one moving more rapidly than the other thought desirable to proceed; but now the case is widely altered. We are placed in competition with the world, and that competition be

keener every day. The great resources our continental neighbours are bringing to bear compel us to move at an equal pace. Railways, canals, and all of locomotion are extending themselves as there as at home. The amount of our manufactures which is exported year by year must tell its tale; and whether we are disposed to look with jealousy, or bestir ourselves, it is evident to me that at changes which we have witnessed during the few years are only the beginning of the great era on to which I before alluded, and render every one of us can make desirable to keep pace with foreign competition. The great resources of Russia are now being developed by the extension of railways bringing her to the ports at a price never before known. America is now recovering herself from the calamity caused by internal commotion, will be found an exporting country than before, the great drain of over-population of our sister island doing much to develop the best resources of the virgin soil of the West. All these, I say, point, with more force than can express, the necessity there exists for the removal of every unnecessary hindrance to the fuller development of our native productions.

When we review the amount of imports of corn, bacon, butter, cheese, eggs, &c., which annually leave our shores, it must be conclusive to every one of us we can only keep even in the race, not only by the removal of all obstacles, but by emulation and encouragement. The interest of the landlord (or I rather say supposed interest) alone being controlling an amount of superfluous matter, being introduced and still insisted upon, in farm covenants, acts as a certain barrier to a better cultivation of the land. To estates contiguous to each other be set on to suit the ideas of men entertaining opposite opinions upon this question, and I will undertake to say that in five years the tenancy and the appearance upon the estate will contrast very differently and most favourably with the other. I am unwilling to believe that there are men to be found who would wish to hold tenants in bondage, as it were; but, in honesty, I am bound to say I have heard a landlord say, "black-frock men are the tenants for me." If such cases of things exist, and I believe it is only in a few cases that they are to be found, this Club will assist me in expressing an opinion that landlords holding these views are as much to be pitied as the unfortunate men who become their tenants.

FIXITY OF TENURE.

Attention of Parliament will be called next to the land question of Ireland. I do not hold argument in favour of fixity of tenure, but what I every agreement should give is this:—A fair compensation for unexhausted improvements. Only recently a landlord told his tenants and the general public at an agricultural dinner, that his tenants felt as if under a hundred years' lease; and so they said but he did not tell them of the hundred and one

circumstances that might arise to make them consider that the long reposed confidence had been misplaced. How many sales of large estates are going on every year and breaking off old connexions! and it must be borne in mind that there is no old association between our millionaires and the tenants of a century upon old territorial possessions; one single discordant sound of the auctioneer's hammer dissevers those ties which preceding generations would have scorned as idle dreams if the slightest insinuation had been made of their possible termination. Has not the uncertainty of life, too, on the part of the occupier, told its sad tale to too many widowed mothers and fatherless families? the *all* spent in putting a farm in a good state of cultivation, with the hope of a profitable return for the investment, when the ruthless hand of the destroyer has made desolate that once peaceful, confiding, and happy home. It requires more of the stoic than I command to say that this is a desirable state of things. I am no alarmist, and I hope this Club will not consider I am painting an exaggerated picture. I fear it is in the power of too many who hear me to endorse, to the fullest, anything I have sketched, in setting forth the various modes in which these questions may be presented to the world in a true and instructive, but not in the most agreeable position for them to be portrayed.

LARGE AND SMALL FARMS.

When this Club last assembled here it was to listen to one of the most elaborate and instructive papers ever read before it. I have had much pleasure in perusing it, setting forth the comparative difference between Continental agriculture and our own. I was prepared to hear we were ahead of them, but we can plainly see, from the information Mr Howard so kindly conveys, that as rapid strides are being made there as here, and gives the same warning to us, which I thought well to make in a preceding part of my paper. Irrigation and sewage, which he points out as being carried on in Italy and Switzerland, are bringing about great changes in those localities, and are deserving the attention of both owners and occupiers, who should realise the necessity for rendering available all possible matter for the reproduction of fertility to the soil, and make serviceable that which in some districts is injurious to the locality and prejudicial to health. The large and important town of Wolverhampton is at this time preparing to convey their sewage, for the purpose of irrigation, to a farm adjoining my own occupation, the progress of which undertaking I watch with much interest.

Mr Howard speaks unfavourably of small farms, and the honourable member for East Norfolk (Mr C. S. Read) confirms the opinions he expressed; and within a few miles of the neighbourhood in which I reside, I have seen enough to convince me of their undesirability—prejudicial alike to the owner, the occupier, and the labourer. Small farms are let at a higher rent than larger ones, and such must of neces-

sity be the case as security against loss, and, from the general want of capital upon such occupations, much less return is made. To the labourer, no doubt, the large farms are of the greatest advantage, giving continuous employ, and on the other only occasional occupation, which I believe to be most dangerous to the labourer, as well as being attended with consequences disastrous to his family. No one with half employment can be considered a desirable labourer; they are frequently the worst men, and when partially occupied, generally require higher wages than are ordinarily paid—and this has the effect of making them dissatisfied with that fair and equitable compensation which is extended to men in constant employ. Hence, it is conclusive that small holdings pay for casual and temporary labour a higher rate of wages than larger ones.

LEASES.

One word upon Scotch farming and leases. As you are aware, in Scotland the general system of tenure is by lease of nineteen or twenty-one years, renewable at a certain period, prior to the expiration of the term specified. The system of farming there has much to recommend it to our notice—land well-farmed, masters and labourers happy and prosperous, the amount of capital there invested contrasting very favourably with that of England. No complaint can there be heard of the uncertainty of tenure, and the want of security for invested capital; the tenant immediately makes a liberal investment with an assurance that there is an opportunity during his term to reap the reward of the same—and it is as applicable to the case of a yearly tenancy, if the security which Mr Cadle sets forth in his essay be acted upon. We were told by the late Mr Grey, of Dilston, a lease will bring a barren heath to the productiveness of a garden, and that a yearly tenancy will return the garden to its original desert state. This cannot and must not be considered a tenant's question only. I feel persuaded that, if either of the systems here proposed were generally adopted, it would tend more than anything else to increase the value of the land of this kingdom, and would give nearly cent. per cent. more available food for the people.

And is this, I say, a thing of slight moment, when we consider that in the last three years we have imported into this kingdom grain to the value of £37,000,000, and £5,000,000 annually of live stock, irrespective of the value of butter, cheese, bacon, eggs, and wool, all of which find a ready market here? Mr Millson has recorded an opinion that the husbandry of Flanders in our plains, and of Tuscany on our hill sides would easily raise food enough for double our population. Mr Smith, of Deanston, whose name will everywhere command respect, has expressed his conviction that by draining and sub-soiling alone, leaving the question of manure out of sight, Great Britain, in twenty years, will become a corn-exporting country; while Professor Johnstone, in his lectures on agricultural chemistry, expresses his deliberate

conviction that, as a whole, this island does not produce one-half the food for man which it might be made to bear with profit to the farmer, and which, by the time our population is doubled, he believes will be found readily to yield. His Royal Highness, the late Prince Consort, who took so deep an interest in the progress of agriculture, in one of his speeches said:—"Agriculture, which was once the main pursuit of this as of every other nation, holds even now, notwithstanding the development of commerce and manufactures, a fundamental position in the realm; and, although time has changed the position which the owner of the land, with his feudal dependants, held in the empire, the country gentleman with his wife and children, the country clergyman, the tenant, and the labourer, still form a great and, I hope, united family, in which we gladly recognise the foundation of our social state. Science and mechanical improvement have in these days changed the mere practice of cultivating the soil into an industrial pursuit, requiring capital, machinery, industry, skill, and perseverance in the struggle of competition. This is another great change, but we must consider it a great progress, as it demands higher efforts and a higher intelligence." His Grace the Duke of Marlborough so aptly said:—"Whatever the material prosperity of the country may be, it must be based on that which supplies the resources of natural life and vigour to the nation." Sir John Pakington also "repudiates the idea of a man placing confidence in his landlord; let him treat it commercially, and place his trust in a written document."

If then we are to credit these assertions—and I fully believe to a great extent in their correctness—I ask my brother farmers if we should not be "up and doing." The name of Earl Ducie is familiar to most in this room; his views upon the question before us are clear and concise. At an agricultural dinner he thus addressed those present:—"Those farmers who look with dislike upon the progress of improvement, under the impression that it operates against themselves, could not entertain a greater mistake, for go through the length and breadth of England, it would be seen that where the landlord was found the most enlightened, the tenant was found in the most flourishing circumstances; the tenant knew his duty to his landlord, and the landlord to his tenant. No question could affect more the relative position of both parties than that of leases; and his opinion was, that till that question was fairly and clearly understood, all their efforts after improvement would fall short of what they ought to be. He (Lord Ducie) would give every tenant a lease, but in return he must have intelligence. He considered a man a fool who invested his capital without security." Mr Randall says, that by sensible and business men, a lease was considered most desirable; but we are often told by landlords, what we know to be a fact, that in very extensive and highly cultivated parts of the country (he alluded to Yorkshire and Lincolnshire), land was occupied from year to year. The farms in the neighbourhood alluded to, remained from genera-

tion to generation in the hands of the same family of tenants, who considered, if they had leases, their farms would be re-valued, and might be called upon to pay an increase of rent, which increased value was mainly due to their own industry and outlay.

SUMMARY.

I need not, in concluding this paper, detain you more than a few minutes in taking a summary review of the points which I think of the most importance for the better security of invested capital, and for the mutual progress and advantage of all classes. In the first place, I feel bound to express my opinion in favour of a lease, considering it the best security for investment of capital tending to the independence of the occupier, and an increase of value to the landlord, with a largely increased production for the benefit of the nation at large. Secondly, in cases where an objection is made to granting a lease, a liberal tenant-right should be given, extending a scale of compensation for unexhausted improvements, and for clean farming to such an extent, or in an equal ratio to that proposed in the agreement selected by the Royal Agricultural Society, and with a twelvemonth's notice to quit.

Having referred to some of the first men of the age, and adduced the opinions expressed by them, and of those now removed from us, whose memories are still dear, and considering the views they entertained and expressed, bearing upon this subject, and to which I will here again call your attention, his Royal Highness, the late Prince Consort, aptly alluded to the position we occupy in the social scale. I have referred to Lord Lichfield from the interest he has always taken in the welfare of the British farmer; to his Grace the Duke of Marlborough, to shew how much the prosperity and vigour of the nation depends upon the supplies of the resources of natural life; to Earl Ducie, the late Mr Grey, of Dilston, and Mr Randall, on the advantages of leases; to Mr C. S. Read, M.P., and Mr J. Howard, M.P., on the comparative advantages to the public of large over small farms; to the late Mr Smith, of Deanston, on the value of drainage and sub-soiling; to Professor Johnstone and Mr Allison, on the practicability of largely increasing the production of our broad acres; to Lord Leicester, on improving the dwellings of the labourer; to Sir John Pakington, for the necessity of treating

contracts between landlord and tenant commercially; to Mr Mechi, as tending to shew that a much larger amount of capital is required for the improved cultivation of the land; to Mr Howard, in drawing our attention to the importance of irrigation and sewage; to Mr Cadle and Mr Randall, as shewing the necessity existing for an equitable tenant-right in the absence of a lease; and to the Council of the Royal Agricultural Society, by offering a prize for an essay on farm customs, recognising the necessity for a better understanding between landlord and tenant.

Perhaps I may have disappointed some present by not recommending something more definite on the vexed question of Game; but from the experience gained by our brethren in the north, you will, I think, see that those who are agreed on things generally have found greater difference arise in this matter than they were disposed to admit. Having referred fully to this question, and introduced instances of the disastrous effects arising from over-preservation, it will, I have no doubt, tend to a discussion and expression of opinion, from which I trust more practical knowledge tending to the solution of the difficulties with which this question is beset, than anything I can adduce; and before I resume my seat, I would say that the landlord should feel that his property is in the custody of one who will not depreciate it, the tenant that his capital is invested in that which will be returned to him at the expiration of his term, and the labourer that he is under the joint guardianship of those men whose interest it is to make him feel that he is not forgotten in the arrangements that are made for the better fulfilment of the various obligations which are attendant upon any satisfactory solution of this great problem. In fact, it is a more equitable adjustment of the right of landlord and tenant that is required. The landlord should feel that his property will not depreciate, but may increase in value; the tenant that the capital expended is still his own as much as the owner who lays out money for improving his estate. And that the threefold cord that binds the interest of those directly engaged in the cultivation of the soil, the landlord, the tenant-farmer, and the labourer, may be strengthened and more firmly united by this and each future discussions is the earnest wish of your humble servant.

FARM CAPITAL.*

BY MR J. J. MECHE, TIPTREE HALL.

ACCEPTING the invitation given to me by your intelligent Club to say a few words about agricultural capital, I approach the subject with a full appreciation of the difficulty of removing long-cherished convictions based upon the practice of our forefathers, who were, no doubt, fully entitled to our respect and confidence ; but the circumstances under which they lived are now changed, and are still rapidly changing, so that we, as landlords and farmers, must deal with these altered conditions in a commercial spirit, which always adapts itself to the peculiar influences that at the time surround it. Who would have thought in my time, some sixty odd years ago, that the smoke from coal would be made to flow in underground channels, and re-appear, almost magically, in our chambers as a blazing light, sending to the shades the gloomy flickerings of the venerable oil lamp, with its contemporary dips and moulds. Again, we have no longer to beat about for three weeks within sight of Dublin harbour in the face of an adverse wind, but can now make sure our voyage with almost unerring regularity. Lovers can exchange soft words, and merchants may buy or sell cargoes at lightning speed beneath the broad Atlantic. In fact, in my early days we had no ocean steamers or railways, no gas, no telegraph, or photographs, no penny post, no cabs, omnibuses, or police ; but we had to boose over our port wine, because the coaches could only accommodate twenty people, who had, in many cases, to book their places a day or two previously, and then to travel at 7 or 8 miles per hour. The now broadsheets of daily news were then puny slips, as cramped as were then our general education and literary opportunities. But mighty steam has changed all this.

And we can and must advance at modern, not ancient speed. I feel sure that you will agree with me in this view of our changed position, and that both you and your landlords will gradually but surely find their way into the profitable stream of steam-driven progress.

"Strong to charge agriculture especially prejudiced
attaches itself to the landowner or those
of the country who are in possession of it
and consume it as they see fit without
assistance! Nor does it have the means
of extending its influence over the masses I
have since repented

James Earl Ray

their folly. Even now there are people who won't believe that the safest place you can live in all your life is constantly travelling in a first-class railway carriage.

It is, in my opinion, too much the custom, and a great mistake, to congratulate each other upon improvements that have been made in our agriculture, rather than to lament over that which remains undone, and for which there can be no excuse, seeing that there is no lack of customers for our produce (one-third of our food comes from abroad), and that our overflowing and rapidly increasing capital goes to encourage foreign enterprises, instead of being applied to the increased fertilisation of our soil. The bright examples of agricultural progress which are so frequently brought to public notice in bold relief, rest as mere specks upon a most extensive and dark back-ground of bad and imperfect farming. It must be so, or we should produce more per acre than the admitted average of less than £4. Remember that I do not speak of Suffolk, or any particular county, but of the 45,000,000 of available acres that constitute the agricultural area of the United Kingdom, as returned annually to the Board of Trade.

It is not in my nature to despond, rather the contrary ; but I consider it a duty to endeavour to awaken public attention to that paramount national question, the means of increasing the food and employment of the people by a profitable and enlarged investment of capital. I am not a believer in large farms, for they are already, most of them, too large by more than one-half for the capital employed both by landlord and tenant. A farm can never be too large where the tenant's capital is £20 per acre, and where the landlord has effected necessary permanent improvements.

My own small farm of 170 acres is an illustration of what should be done—for with a tenant's capital of £16 per acre, there has been for several years an annual surplus of more than £600, available for rent and profit, after paying every other expense.

In this case the landlord (myself) bought the land for 25s per acre, and expended nearly as much in drainage, building, roads, removal of trees and fences, and other improvements, thus raising the rent to 40s. per acre.

The time will come when a landowner will be appreciated, not by the number of his acres, but by the amount of his rent-roll, the latter representing a high rate of rent, and a well-ordered estate.

Steam-power has so multiplied population, by affording increased and more profitable manufacturing em-

ployment, that we are now no longer in the primitive pastoral period, when the people were few and the acres many. All this is being rapidly reversed.

	Population.	Available Acres.
In 1800.....	10,000,000	45,000,000
„ 1869.....	32,000,000	45,000,000

These thriving and hungry millions who throng our manufacturing districts demand of us agriculturists (I mean landowners and their tenants) a change of practice, and a progressive increase of food more in accordance with the rapidly enlarging demand for it.

A considerable area of land is passing into the hands of manufacturing and commercial millionaires, who happily, in many cases, bring to bear upon the soil the power of intelligence and capital, unfettered by a previous attachment to antique customs. I consider it a disgrace to us, that wanting 10,000,000 quarters of foreign wheat annually, besides other grain, we permit one-half of our acreage (22,500,000 of acres) to remain in primitive pasturage, producing a minimum of food, and employing a minimum of labour. I know that there is a strong feeling in favour of permanent pasture; but when I see that I can, not infrequently, realise on my poor farm as much as from £15 to £26 per acre in corn straw, I feel vexed that those 22,000,000 of acres of permanent pasture should be starving the people, by producing probably not more than 40s. to 50s. worth of food per acre.

I now proceed to enquire—

How much is the Capital of British Agriculture?—I mean the landowners' and tenants' capital. Taking the average of the kingdom, the 45,000,000 of acres returned to the Board of Trade, the landowners' capital would probably be £33 per acre, or £1,500,000,000, besides the value of timber, possibly £30,000,000 more. The average rent is probably 25s. per acre, or about £56,000,000 annually.

The Farmers' Capital can hardly reach £5 per acre, or £227,000,000.—I have taken no account of the mountains, wastes, &c., which are not enumerated in the Board of Trade returns. My estimate of the farmers' capital may appear low to arable farmers, but we must not forget that 22,500,000 acres (half the land) are in permanent pasture, much of it very neglected, and employing little labour or capital. The gross saleable produce I estimate as under £4 per acre, or £182,000,000; probably £3, 12s. would be nearer the truth.

Additional landowners' capital will be some day required in the matter of town sewage, for on to the land it must ultimately go. Probably it will be dealt with (when landowners can agree) on the principle of the great Fen drainage, by Acts of Parliament and local commissioners. The London sewage will be indeed a great affair, for it takes the annual average produce of 20,000 acres, landlord's measure, to feed the population of London for only one day, and about an equal quantity weekly to feed the horses of London.

One can judge from this how great must be the

daily manurial power and value of the London sewage. Farmers will then have sewer meters (as manufacturers have water meters), and take their supply according to their requirements. If I am asked by landowners where the capital is to come from for necessary improvements, I point to the several land improvement and drainage companies which are overwhelmed with unused capital, seeking for employment in this agricultural channel that remains, as yet, almost unopened to it.

Covered yards, cottages, farm-houses, roads, drainage, &c., may be all effected even to the extent of £20 to £30 per acre, without any outlay on the part of the landowner, and at a moderate annual charge, divisible in equitable proportions between landowner and tenant, to both of whom it must prove a source of profit, as well as the nation a boon.

When I purchased my poor land in 1841, it cost me £23 per acre. I invested nearly that sum in drainage, roads, and buildings, clearances, and machinery, so that I have to pay myself 40s. per acre annual rent. Last year, 1868, I sold one field of white wheat for £23 per acre, and the straw for an additional £3, 10s. My farm capital is £16 per acre, invested as follows on the December 31st last.—(See details at p. 45 of my book, published recently by Routledge & Co., Ludgate Hill, London):—

Live stock . . .	£6	10	0
Farm horses . . .	1	1	0
Tillages, manure, &c. . .	3	15	6
Implements and machinery . . .	2	10	0
Hay, corn, &c., unsold . . .	2	5	0

Per acre . . . £16 1 6

This may appear to you a large sum, especially for live stock and tillages, but I want you to believe that the considerable amount invested in live stock, fed mostly on purchased food, is the very key to my profit, and to those large and frequent crops which many people will hardly credit until they see them. The costly tillages arise from very deep cultivation, and a much larger dose of rich cake and corn manure than is generally administered. It is thus that I grow 40 tons of mangold per acre, as I have done this year; and this, too, accounts for my frequently growing from 6 to 8 qrs. of wheat per acre, and on my highly manured clover leas two heavy crops of wheat in succession (the second crop Rivett wheat). Some of you have on various occasions seen my crops, and can form your own opinions. Although not a good season, my best two fields of white wheat have yielded 6 qrs. per acre, and my barley (grown after 6 qrs. of white wheat) was threshed last week, and yielded over 6½ qrs. per acre, sold at 38s. per qr. The quantity of seed wheat drilled was 1 bushel per acre, and of barley 6 pecks per acre. This has not been a good year for arable land farmers, for the crops vary a good deal, and the price of wheat is now very low. Stock breeders have the best of it this year, for the abundant

crops of roots and hay have caused a large demand for their store stock at higher prices. They, however, suffered severely in 1868 from the drought, while the arable farmers prospered, especially on heavy lands.

My experience has taught me that, on such farms as mine, £16 will pay a much better profit on one acre than on two. Poor farms require more manure, and consequently more live stock than rich farms, and, of course, much food must be provided that did not grow on the farm, thus adding to its fertility. Many Norfolk and Lincolnshire farmers have from £20 to £30 per acre capital. They are thus enabled to hold their corn a proper time, keep plenty of stock, and purchase food for it. I could do better than I do now had I £20 to £25 per acre capital; £16 is not enough. I presume, from my knowledge of Suffolk, that its general tenants' capital does not exceed £7 to £8 per acre, and that there is ample room for investment of landlords' capital in drainage, buildings, and other necessary improvements.

It is true that you have more grass-land than I have (I have only 14 acres), but I predict that the introduction of steam cultivation will annually diminish the area of pasture, especially of poor pasture in heavy land. Steam cultivation will place land in a more favourable position than it has hitherto had. The advantages of ample capital are obvious. You can buy when other people are obliged to sell, and sell when other people are compelled to buy, and can maintain ample stock and machinery. Ample capital sometimes leads farmers to hold their corn when they ought to sell it. As a safe maxim, I would say, always hold wheat at 40s. per qr., but sell when it is at 60s. I have known of a good deal of money lost by farmers who always hold their corn for a higher price than buyers are willing to give. We see, in consequence, old corn stacks riddled by rats and mice, and, when threshed, minus the grain. Capital with judgment is an immense power, and only fails when it is overstrained.

If I am asked how I would employ additional capital, I reply that our subsoil, immediately below the ploughed soil, is now a mass of undisturbed poverty, unaerated, unmanured, and unfit for the roots of plants; we dare not in its present unwholesome state bring it to the surface and bury our top soil; we should, therefore, uncover the subsoil by ridging or ploughing together the top soil, and incorporate with the subsoil an immense quantity of rich manure. To obtain the additional manure, a large capital must be invested in live stock and purchased food. In fact, to farm to the greatest advantage, the soil and subsoil, to the depth of 3 feet, should be well manured; now, we only manure the top 5 or 6 inches. Our root and green crops can never be over manured, for they feed in the deep subsoil when in a fit condition. Market gardeners understand this well, and around the metropolis they easily grow 70 tons of mangold per acre, and other crops in proportion.

This system of large capital, and highly manuring, has an immediate bearing upon the growth of beetroot, either for sugar or for distilling. In times to come, factories for both purposes will be greatly multiplied. Landowners are very anxious on this point. They say to me, "It is all very well for our tenants to sell off their roots, but how about the restoration of fertility?" My reply is, let them farm as they like, provided they invest a capital of £15 to £20 per acre, one-half of it invested in cake-fed live stock. The frequent growth of red clover and Swedes is rendered impossible by the absence of manure in the subsoil. Baron Liebig, and the late Rev. Samuel Smith, of Lois Weedon, well understood this. Before free trade, "Down corn, down horn" was the motto. Since then, bread, milk, butter, and cheese have increased in price, and are free from the fluctuations that occasionally, as at present, depress the price of wheat. Let us, therefore, go in for more live stock and more capital. The return of the beet pulp to the soil restores most of its inorganic elements, and they to some extent prevent exhaustion.

Live stock purchased cheaply in July, when feed is scarce, pays well for carrying on with a little cut straw, cake, &c., until the root season commences. Poor land may be almost immediately made fertile by heavily folding with sheep, consuming £10 or £15 worth per acre of cake, corn, hay, roots, &c., not the produce of the land on which the sheep are placed—supposing that there should be a loss even of £3 to £5 per acre—great will be the after gain. This system requires capital; but where there is capital, it is by far cheaper than guano or other artificials. Where my 40 tons of mangold per acre grew this year, the land was autumn-manured with shed manure at the rate of £20 worth of cake, &c., consumed for every acre manured, and some guano in addition. This is what I call capital farming, as well as farming with sufficient capital. It is the true way to make land pay. The land of England is generally not one-third manured. One can never over-cultivate or over-manure, for a root crop especially, when, like mine, it follows two wheat crops, and is followed by another wheat crop. There is no need for landowners to tie down tenants who farm with a capital of £20 to £30 per acre. Their land must improve under such circumstances.

Your sugar-beet land should be all richly manured and very deeply cultivated before Christmas, and only scarified and guanoed before sowing in April. This I find is the best plan for mangold.

My farm is all arable except 14 acres of permanent pasture. I have no fences except an external one; and I am very glad to hear that some of your distinguished landowners have realised the propriety of removing many of those fences and pollard trees that disfigure the country and prevent the farmer from deriving the full benefit of his land, for you know he has to pay rent for the ground occupied by fences, trees, and their roots, besides suffering a diminution in his crops. A farmer of 600 acres told me the other day that he

offered his landlord an extra £100 per annum rent, provided he might clear the ground of those obnoxious and unprofitable obstructions to good tillage. Yet his offer was declined, although the growth of the timber did not come to one-fourth of the proffered annual increase of rent.

Now that 30-horse power steam-engines are cultivating 36 acres per day, we shall soon see such a clearance as at one time was never anticipated. Said an implement maker to me at the show last week, "A farmer declined to buy one of the great traction-engines because his gateways were too narrow!" The implement maker wondered, smiled sarcastically, and thought many things—some of which he told me.

Remember, that while I advocate ample fields untimbered, I strongly urge the formation of plantations or belts at intervals, not only as shelter, but as breeding places for birds—the farmer's friends. We must remember, that as we clear and drain the country, we not only produce a drier and warmer climate, but our buildings should be strong enough to resist the gales that will sweep less interruptedly over the country.

By the way, speaking of tillage, my trustworthy friend, the Rev. Mr C., plumbed the depth of the cultivation at Buscot, near Farringdon, the other day, and found it to be 30 inches. It was done by two of Fowler's 30-horse power engines, and when the land is cross cultivated the depth is to be 3 feet—in preparation for sugar-beet. My shallow-drainage friends may as well take a hint, and consider whether even 4 feet will be deep enough when the 50-horse engines are put to work.

We are on the eve of many great changes—your middle-class college, so creditable to Suffolk, is doing much to enlighten the rising generation of agriculturists. The Royal Agricultural College at Cirencester, in which I, many years ago, took a great interest, has now become an established institution, granting diplomas for agricultural efficiency, and sending forth men learned in the theory as well as practice of agri-

culture. I begin, therefore, to hope that the peroration to a lecture which I delivered at Chelmsford in 1852 (seventeen years ago), may soon be in some degree realised. I therefore give it as a conclusion to this long paper, which you have heard so patiently, trusting that I may ultimately be found a true prophet.

"I see in perspective a railway activity pervading agriculture. The time is coming when farms will be squared, trees removed, and game moderated; when tramways will intersect estates, and one horse will draw to market the load of four; when the sewage of our towns will ebb back to its original source, when the waters of our rivers and drains will be applied to the irrigation of fields, when our millers will use steam instead of water, when our farmers and their children will be better educated and rank higher in the social scale, when our labourers will be better housed, taught, and fed. Then will the blundering rudeness and clumsiness of ignorance be exchanged for the watchfulness and thought of an enlightened intelligence; then will the fractional calculations of profit outweigh the fears of cost; then will antiquated territorial legalities be superseded by personal responsibility, identity, and possession.

"I see all this in the distance; it is a mere question of time. I see mighty engines on railwayed open fields, tearing up furrows a yard deep, making the land look like a sea. I see those hungry earthy masses saturated and immediately fertilised with the sewage of towns. I see ample evaporation and facile percolation. Tottering and dilapidated farmeries will give way to permanent and convenient homesteads; the pinching enemy of a penurious and pernicious system will be exchanged for liberal views and large operations; capital will develop its giant strength, unfettered by seigniorial restrictions; agriculture, commerce, and manufactures will unite by the ties of a great common interest and common intelligence for the good of our people and for the honour of this great nation."

Papers by Tim Bunker.

NO. XXVIII. TIM BUNKER ON AGRICULTURAL SHOWS.

MR EDITOR,—Jake Frink is a fool, as you might know by his letter. You see I was a joking him about the interest he and his neighbours have got to taking about my affairs, since I begun to lay tile and write for the paper. I can't stir, even early in the morning, but Jake'll poke his head out the window, nightcap and all, and want to know "where upon airth I'm gwine to neow," just as if I had never been off my farm before. But the thick-headed creatur never see the drift of my remark about sending an apology, and went and wrote that letter. Everybody that knows me knows well enough that I seldom do anything to my neighbours that I have to apologise for, and when I do I am apt to make it in person. Jake's letter looks curis up here, and I shan't hear the last of it in a year. All I have to say is that I'm glad to set him to thinking. Folks had better be thinking of something, even if they don't think straight, than to be as stupid as dolts. Jake may make something yet if he keeps thinking.

I went up that morning to the city to attend the annual meeting of our Agricultural Society. At our Society after the show there was a great deal of talk. Some very sensible men got disgusted, and declared they never could have anything to do with the Society. They said they countenanced horse-jumping, and other kind of growth, and not horse *jumping*, and *raising* of industry and good morals. The people who had the management last year, followed their own tastes without meaning any harm to the Society. They would have done better, if they had had better advisers. If the friends of good order would take the pains to be in their places, and their influence felt, they have no right to grumble when things go wrong.

The result was, that we had the largest annual meeting we have ever held, and a new board of officers were put in, without much division of sentiment. The Colonel's friends were so much ashamed of their own folly, that they did not make any show of opposi-

the Society had got along where it would take care of itself. But things do not take care of themselves in this world. If you do not plant green crops, briars and thistles will grow. If the friends of an Agricultural Society do not follow it up and shape its policy, it will go wrong. We have no right to put our hand to the plough and look back. If we do, we are in very poor business to grumble that others stand at the plough-tail in our place. About the meanest thing a man can do is to grumble. If he can't help it, grumbling will do no good. If he can, he ought to go to work and stop chafing.

I had to work about a month, before the meeting, riding round and talking with grumbling people, before I could get things into the right shape. I have always observed that there was great virtue in talking. If you have a good cause and keep it before the people perseveringly, you are certain to carry it in time. I knew if we could have a full meeting from all parts of the county, and talk matters over, we could come to a good understanding, and make the Society efficient in doing its appropriate work, which I take to be horse *raising* and other kind of growth, and not horse *jumping*, and *raising* of industry and good morals. The people who had the management last year, followed their own tastes without meaning any harm to the Society. They would have done better, if they had had better advisers. If the friends of good order would take the pains to be in their places, and their influence felt, they have no right to grumble when things go wrong.

The result was, that we had the largest annual meeting we have ever held, and a new board of officers were put in, without much division of sentiment. The Colonel's friends were so much ashamed of their own folly, that they did not make any show of opposi-

tion. These agricultural shows are doing so much good, that I think every good citizen ought to make sacrifices, if necessary, to sustain them. If they are attended with some evils, as much can be said against all other forms of associated effort. The millennium has not come yet, and no wheels move with so little friction that they do not need grease sometimes. Apply oil and stop the squeaking. Our Society has done more to set folks to thinking about the principles of farming than anything we ever had among us. There has been a steady gain every year in the variety and excellence of almost everything exhibited. The farmers see this and understand it, while city people and careless observers think every show is just alike, a chaotic mass of cabbages, turnips, and other roots; corn and other grains; horses, cows, pigs, and poultry. But the farmer recognises at once the new kinds of cabbages, turnips, and potatoes, or any new comer among kine or swine. There is something to be learned every year. I have no doubt that Seth Twiggs, Jake Frink, and Uncle Jotham, have done more thinking about their business, the last two years, than in all the rest of their lives. And when folks begin to think about raising stock, and cultivating the best crops, they soon discover their own ignorance, and seek light. They want to talk and read. There are ten agricultural papers taken in this town where there was one, two years since. The Farmers' Club is well attended, and the discussions are a good intellectual treat to everybody that has a rod of land to cultivate, and that is everybody here. The minister, the lawyer, the doctor, and the schoolmaster, are generally there, and the farmers come in from the whole neighbourhood. Now all this has come of the shows. The Society has left its mark in everybody's yard or garden, dropping young trees, apples, pears, peaches, cherries, grape vines, and flower borders. The homesteads look more cheerful, and the people are more thriving in their business. This year the Society has offered a premium for every tree set out in the streets. We mean to line every roadside in the county within five years. Even Jake

Frink is beginning to dig holes to set out trees this spring. His old friends will hardly know Jake, or his establishment, in a few years more.—Yours to command,

TIMOTHY BUNKER, ESQ.

NO. XXIX. TIM BUNKER AT HOME AGAIN.

MR EDITOR,—I have been gone from home four whole months, and I do declare if they wa'n't the longest months I ever experienced. I haven't seen anything of your paper, and not much of any other, as to that matter, since I went off, and I've pretty much lost the run of things up here. It was curis how it happened, so curis that I haven't got over my astonishment at the thought of my journey yet. I couldn't hardly believe I'd started, until I got home. I should have said, a year ago, that it would have taken a coach and six to have drawn Tim Bunker away so far. But lo and behold! I've been on a journey of a thousand miles, and got back alive. I've seen the elephant from trunk to tail, and the next time I go on any such fool's errand you see I shall stay at home. They call it L. E. Fant, Esq., and think it is a joke. I did not find it any joke at all.

The way it happened, you see, was this. Wife and I have always stayed at home, hardly ever venturing further away from Hookertown than down to your village, when I had cattle to sell, or something of that sort. We were a very quiet sort of people, and never had much company outside of our own circle of friends, until I got to writing for your paper, when the tide seemed to turn, and lots of strangers began to call on us. After that account of the wedding by your reporter, they come so plenty that my wife said she should have to go down to Shadtown, to live with Sally, in order to get rid of company. You see everybody that comes to Hookertown—and a good many come here in summer—has to look up Tim Bunker, and stare at him, jest as if he was a lion. They would go by, looking at our house as if it was haunted, or some man had committed murder there. One fellow came up here with a looking-glass on three legs, and said he was going to

take a picture of the house for some illustrated paper. I was called on before breakfast and after breakfast, in the field, and in the barn, early and late, until I was troubled to get time to attend to my own business. Now this would have been very pleasant to a politician, or a man born to fame, but it was mighty uncomfortable to plain country folks like Mrs Bunker and I. There is nothing a man pays so dear for as for his honours.

Well, things come to such a pass that Mrs Bunker declared she would not stand it any longer. She laid down her gold-framed spectacles, the same that Josiah gave her, one evening last December, and says she, "Timothy, our house is getting to be a tavern, and I should like to go off and have a rest this winter."

"Well," says I, "where will you go?"

"Anywhere to get out of Hookertown, where you are not known."

"Very good; pack up the trunks, and we will be off next week."

I had no idea of her going, but I see in a day or two that she was in earnest, and when a woman has made up her mind you know there is no use in talking. So we started on our trip, and to make certain of getting into a place quiet enough for Mrs Bunker, we fetched up in the north of Orkney. There was not any other house in sight, and no neighbours within a mile. It was mighty lonesome. Thinks I to myself, "if Mrs Bunker wants a quiet time, I guess nothing will hinder her here." It was mighty nice for a week or two, and she was delighted with the woods and flowers, the dogs, pigs, and poultry. The third week she began to miss the papers, and to inquire about the post. The fourth week she began to talk about John and Sally. By the time two months were up, she spoke of Hookertown very peaceably. At the close of the third month it was a very handsome place, not so prettiest village she had seen in her journeyings. Now that she has got home, she declares it is the centre of the world and the tip-top of creation. That is

rather a strong statement, but as I never dispute a woman's word, I shall have to let it go.

Now I can't tell you anything about what I see, 'cause you see folks that have not been there would not believe me, it is so unlike anything at home. But I jest want to say, that if anybody or his wife gets restless and uneasy, that is the country to go to, to get cured up. It is better than anything else; I haven't seen so contented a woman in ten years as Mrs Bunker, since she got home. She says she never will say another word about company as long as she lives; and as to her neighbours, they are the handsomest people in the country.

I guess she is about right. It does some people good to go away from home once in a while, jest to see how the rest of the world live. They generally come home wiser and better. Every thing has gone on well in Hookertown since I have been gone—just as well, for aught I can see, as if I had been at home. There are some people who think the world will come to an end when they die. Let them step out of the traces a few months, and then come back and see how smoothly the world spins on without them, and they will be cured of that folly.

There is only one thing that shocks me on coming home, and that is the blue window shutters of my neighbour Seth Twiggs. What upon earth possessed the man to have 'em painted that colour, I don't see. Shutters, indigo blue, in this nineteenth century, and in Hookertown, too! It is an atrocity. Just as if there was not blue enough in the heavens without a man's putting patches of it on to his house! I asked Seth about this, the first thing when I got home. Says he, "Tim Bunker, you don't know every thing, tho' I admit you are a knowing man. You see I smoke a good deal, and blue is the handsomest colour in the universe. It is blue inside very often, and I thought I might as well have it blue out of doors to keep the balance." I had nothing to say, and have only to add—Yours to command,

TIMOTHY BUNKER, Esq.

NO. XXX. TIM BUNKER ON RAISING BOYS.

MR EDITOR,—As I was going down by the horse-pond lot, this morning, the same one that I drained last year, I found Seth Twiggs' horse, Jotham Sparrowgrass's cows, and Deacon Smith's flock of sheep, turned into my oats. It looked as if they had been in the better part of the night, for the oats were badly trampled. It so happened that I had fixed one of the gate posts yesterday and the dirt was all nicely smoothed off, and the enemy who had done this had left his foot-prints by the gate-way. I took the measure of the shoe print, and walked straight up to Jake Frink's, and inquired for his oldest boy Kier, a young fellow about eighteen, who is up to all manner of monkey shines, and has got a terrible bad name in Hookertown. Kier was called in, and it was found that the measure exactly fitted the shoes in which he stood, length and breadth of top and heel.

Jake Frink was a good deal astonished, when he see that his boy was caught in such an unneighbourly trick, but I don't know why he need to be, for he has had no sort of control over his boys, and always let them choose their own company and pursuits. Kier has got a notion of drinking, the last few years, staying all night at the public house, driving fast horses, unhinging gates, cutting young fruit trees, firing stacks, and turning cattle into corn fields. He seems to think it is very smart to destroy property in this way, and to make himself a nuisance in the neighbourhood generally. He is caught now, and must walk up to the police office and settle. The next worst thing to a bad father is a bad public opinion that submits to vice. I am Justice of the Peace, and if I was not, I am a neighbour to Jake Frink, and bound to help him keep his boys in their place. I have a very poor opinion of that moral cowardice which gives up a civilised community to the depredations of a set of young Arabs, like Kier Frink. What is the use of having law, if you do not enforce it against the destroyers of property and the disturbers of the peace? If the young chaps want to cut up, and have music, it is fair that they should pay the fiddler. If they rob hen-

roosts, the hens should not be left to do all the squaking. It will do them good to look out of a roost, with iron grates to the windows.

Now, I hold that a man is a poor farmer, as well as a bad citizen, that raises such a boy as Kier Frink. The farm exists for the sake of the family that works it, and *its chief end is to make smart, useful men and women.* Your great crops and fine stock all go for nothing, unless you get the blossom of the farm—man. What is an apple tree good for, unless it raises apples? The shade is no better than that of any other tree, and the fire-wood does not amount to much. So the farm is not worth much, unless it blossoms out into good, nice housewives, and useful, upright men.

It is a good deal of a knack to raise a first-rate cow or steer, even after they are born right. There is many a full blood heifer, with first-rate milking qualities, spoiled by bad treatment. Keep her on bog hay in winter, and let her run in the road in summer, and I guess she would never amount to much. And you might have high grade Devons, with all the elements of splendid cattle in them, and treat them so when they were calves and yearlings, that they would not be worth anything. You might dwarf them or lame them, or injure their horns, or make them ugly and dangerous by bad handling. An ox known to jump fences, or kick, or gore cattle, is very much depreciated in value.

It is just so with the human stock brought up on a farm. Almost every thing depends upon the bringing up—a great deal more than it does with the brutes, for the animal nature of man is only a small part of him, and his moral nature and habits are almost entirely shaped by those who have the care of him, while he is young. If this gets the right start, I have always noticed that it generally brings every thing else along right with it. If a fruit tree gets to bearing when it is young, all the forces of the tree will run to fruit, and you will not be troubled with too much wood and foliage. And if a boy blossoms out into the virtues of industry, truthfulness, honesty, temperance, and purity, I think it is pretty

polish. You can put the shine on to a leather boot, for there is some substance in it. But you might rub brown paper with the best of Day & Martin till doomsday, and not get a bit of gloss; there ain't substance enough to hold the blacking. And you can put the polish on to marble, and bring out leaves and flowers, and all sorts of ornamental things, upon the surface; but you might as well undertake to polish hasty pudding, as to do anything with a piece of chalk. It won't hold the stroke of the chisel, or respond to the touch of pumice stone.

And it is just so with sending a woman in the gristle to a fashionable boarding school. A girl wants to be solidified by home duties, and solid studies, before she is fit to be sent away to take on polish. Something ought to be done for her physical education, to make her body fit for the responsibilities of house-keeping, and I don't know of anything better than to have her help her mother. A woman has no business to be married until she has shewn her capacity to keep house. She should know how to do everything, from washing dishes up to the nicest kind of cooking and needle-work.

If they are ignorant of these things, accomplishments won't save them from mortification and domestic unhappiness. They will be as bad off as poor Eliza was at her first dinner party, after she got into her new house. She had not been married to Dr Sturgis more than two months, before she invited a company of their friends to dine. The Doctor and his wife were there, and quite a number of middle-aged and elderly people, like Mrs Bunker and myself. There was a great display of silver ware and fine linen upon the table, forks, castors, spoons, napkin rings, and fruit dishes, that you could see your face in, and china plates, platters, and vegetable dishes with gilt edges, and nosegays in the middle, so handsome and natural that you could almost smell the perfume of the flowers. There was an air of triumph upon the face of Mrs Doctor Smith, as we sat down to dinner, as much as to say, "Now we shall see what it is to have a

daughter educated at a fashionable boarding school, and keep house in style." There was considerable unction about Mr Spooner's grace before meat, as if he had got it up for the occasion. The company were in the best of spirits, and Dr Sturgis was slicing away at the turkey's breast, when attention was suddenly arrested by sundry corn, oats, and barley, slipping out of the undressed crop of the fowl. The women folks at that end of the table put their handkerchiefs to their noses, as if they had got wind of something that did not smell like the roses on the bottoms of their plates. Mrs Doctor Smith fidgetted about in her chair, as if she was on pins. Eliza looked as crimson as a beet, clear to the roots of her hair. The Doctor was at the other end of the table, very busy discussing the last sermon or election with Mr Spooner, and did not see the trouble. Our Sally looked wicked, and winked across the table to Josiah, and there was a twitching about Josiah's mouth, that I should say was wicked also, if he was not a minister. Dr Sturgis got over the matter nicely, by remarking upon the undone condition of the turkey, and calling a servant to remove the dish. Fidelity to truth, I suppose, did not require him to tell whether the rawness pertained to the cooking, or the dressing of the fowl, or the housekeeper, that lay back of both. Fortunately a liberal allowance had been made for the dinner, and the boiled fowls, purchased of a farmer who married a housekeeper as well as a woman, did duty for the roast turkey cooked with his crop in.

Now I suppose a good many of your readers among women folks will hold up both their hands in astonishment at my standard of a good housewife. I say it is a shame and a disgrace for a woman not to know how to do everything that is done, or ought to be done, in her kitchen. There is just as much merit and womanly worth in knowing how to bring a turkey upon the dinner table, so that it shall not be offensive to the smell and taste of her guests, as there is in singing a good song, or in dressing in good taste. It adds very much to the comfort of a woman to know how to

do everything from garret to cellar. The polish is all well enough, but let there be something in the first place to put the polish on to. This doll work, in the place of a good old-fashioned wife that knows what she is about, is poor business.

Now, what I want to say to all parents that are bringing up girls is just this. Do

not be afraid of putting them into the kitchen—that school of womanly virtues—and keeping them there till they can tell the difference between a churn and a tea-kettle—till they know how to scour a saucepan, black a stove wash a floor, and cook a turkey.—Yours to command,

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TIMOTHY BUNKER, ESQ.

The Garden.

PLANT PROGRESS AND ITS PROMOTERS.

THERE is no bush so small, but casts its shadow," says the old proverb, and, let us add, there are few plants so unimportant that, in the hands of the skilful hybridizer, something useful cannot be made of them; while, on the other hand, the very aristocrats of the vegetable kingdom yield equal obedience to his will. Wonder we at the power of the horse-tamer who demands, and at length obtains, submission from the apparently intractable steed; much more have we occasion to be surprised at the results of cross-breeding among plants, worked out by means of patient scientific intelligence. Who, for instance, would have thought, at one time, that that glorious family, the Orchids, would have condescended to favour us with hybrids; yet, under the application of proper means, rightly directed by Mr Doming, some charming cross-bred Orchids adorn the plant stoves in the Messrs Veitch's princely establishment, a circumstance which has led us to suspect that many so-called species belonging to this ever beautiful, ever interesting class of plants are in reality mere mules, the result of accidental crosses in a wild state. Whether mules or species, however, matters little to the cultivator, who values them only as objects of ornament, leaving the botanical consideration of the question to whom it may concern.

Turn we now to Pelargoniums, we have only to consult Sweet's *Geranaceæ* to discover what wonderful improvements have been effected in that important family of ornamental greenhouse plants. By means of careful selection and cross-breeding, small flowers have been made into large ones, long, flimsy, sharp-pointed petals converted into short stout round ones, and even dull colours rendered brilliant and attractive. For

achievements such as these we are indebted chiefly to such raisers as Beck, Foster, and Hoyle, from whom still emanates fresh acquisitions, which, though perhaps scarcely so striking as the productions of former years, are yet sufficiently different from existing kinds to be rewarded by our best judges with certificates. So much for ordinary flowered Pelargoniums; but what about our fancy kinds? From what source did they at first spring? All, we believe, that is known about them is that they came to us from the Continent, and that one of the earliest growers of them was Mr Ambrose of Battersea. Once, however, in our possession, improved varieties soon made their appearance, and the wondrous beauty and size of some of the plants of them shewn at our great metropolitan exhibitions by Messrs Turner, Bailey, Fraser, and others, claimed for them universal admiration. Among fancy varieties may now be found so much diversity of colour and marking that a mere looker-on might imagine improvement in this section could go no further; but the "cry is, still they come!" and come they do, even at the present day, in great variety, and in colours and shape so good as to outstrip all predecessors. But another class of Pelargoniums still commands our attention, viz., the Nosegays. For improvements among these grateful thanks are due to the late Mr Donald Beaton, who, after years of toil and exciting expectation, left behind him a "strain" unsurpassed in the section to which it belongs. Of the whole stock of Mr Beaton's plants, Mr William Paul became the fortunate possessor, and, although it is said "there is no use in blowing a fire that burns well," the fire which Mr Beaton had lighted did not burn bright enough for Mr Paul, who presently set to work on the stock

which he had obtained, and every year since then has witnessed some striking novelty in this the most ornamental of all classes of Pelargoniums.

But flowers of Pelargoniums have not alone engaged the attention of florists; their leaves have also been the subject of watchful solicitudes, more especially those in the zonal section, in the improvement of which Mr Grieve, of Culford, has long and zealously laboured. His triumphs in the shape of leaf-adornment have indeed been carried to a pitch almost beyond belief. Into the horse-shoe kinds of antient times—the pride of the cottager's window—he has managed to infuse nearly all the colours of the rainbow, and has brought out new developments of such undreamt of beauty, that a whole host of experimentalists, panic-stricken at his success, have been induced to follow in his track. Notwithstanding this, however, Mrs Pollock kept her ground for a long time against all comers in the Tricolor class. With the production of Bicolors the name of Mr Wills must be honourably associated, some of the varieties of that raiser being unequalled in point of beauty, while numerous fine variegated leaved sorts adorn the rich collection of Messrs E. G. Henderson; and, as regards variety of colour in the blossoms of the zonal class, it now comprises every tint from pure white to brilliant scarlet. Indeed, kinds with fine flowers as well as handsome leaves are plentiful as blackberries in Mr Bull's establishment, as well as in the nurseries in the Wellington Road.

Let us now advert to the Dahlia, the stronghold of which is in the Royal Nurseries at Slough. The Dahlia is well known in England and after the peace of 1814, when peace enabled us to import the noblest varieties of both the French and English Dahlia, the English Dahlia was introduced into the country. The Dahlia was introduced into the country by the French, and it was at first called the *Reine Hortense*. The ingenuity of our horticulturists has since appeared more conspicuous than ever in the treatment of the Mexican plant, and

through their art the flowers of the Dahlia have had their petals doubled and quadrupled, until they have become as numerous and as full as those of a China Aster, whilst their colours have been even more increased than their petals. All the most prized varieties of this flower are said to have had their origin in a single purple sort; yet, what association is there between the two extremes? At one end we find full and beautiful blossoms, faultless in form; at the other, flowers meagre and uninteresting as those of the field Chrysanthemum. Nevertheless, *Dahlia imperialis* is reported to make a good and effective bedding plant.

Some forty years ago there existed in our gardens what were called purple and scarlet globe Dahlias—dwarf compact sorts, with ball-shaped flowers. These have years ago been lost sight of, but in their place we have a charming set of miniature Dahlias termed Liliputians. These are so dwarf and neat in growth, and have such pretty little flowers, that they have become great favourites for bedding purposes, especially in small gardens.

Contemporary with the Dahlia, as regards the period of blooming, is the Hollyhock, for improvements in which, of a striking character, we are mainly indebted to Messrs Chater, Paul, and Downie, Laird, & Laing. The cultivation of this majestic eastern plant in this country is of great antiquity, dating back as far as the fifteenth century; but it is only within these last twenty years or so that its improvement has been taken in hand by us in earnest. The noble stalks which Hollyhocks send up, like so many floral banners, render them particularly desirable for ornamenting shrubbery borders, and for giving gaiety even to more conspicuous situations at a late period of the year. It is not unaccountable, therefore, that a flower possessing so many shades of colour as the Hollyhock does, and withal so stately, should have attracted attention. The wonder rather is that it should have remained so long unimproved. This, however, need excite the less regret, when we consider with what rapidity it has been raised from a common cottage-garden flower to one fit to adorn the grounds

of a Royal residence. Seen as if emerging from among evergreens by the sides of rural walks, nothing can have a finer effect than Hollyhocks, which some even prefer to Dahlias, so much has their beauty been augmented. Perfection, indeed, seems to have been arrived at in regard to this flower.

An old favourite in our gardens is the Fuchsia, the history of the introduction of which is, as the tale goes, somewhat romantic. Messrs Lee, of Hammersmith, were the first of our nurserymen who had this plant on sale, and connected with their possession of it is the following legend, without which, or something like it, some might deem any account of its early history incomplete. Joe, a marine, had a sweetheart in Wapping, called Polly. Joe saw a little flowering shrub in Chili possessed of great beauty, and, ever mindful of his Polly, the thought struck him that she would prize so graceful a floral offering. He accordingly brought it home, when it proved to be *Fuchsia coccinea*; some member of the firm just named saw and bought this Fuchsia, breaking it up, it is reported, into cuttings in the presence of Polly, who thereupon repented of her bargain, doubtless apprehending Joe's displeasure. A promise of another plant of her favourite when the cuttings had struck root, however, set all to rights. Be this as it may, the Fuchsia was certainly presented by Captain Firth to the Royal Gardens at Kew about the same time, and it was soon afterwards distributed as a Stove plant. From the Stove it was removed to the Greenhouse, and it is now found to be sufficiently hardy to stand in the open garden, and, like the China Rose, which was for some years treated as a tender plant, it is found to grow with greater luxuriance in the open air—by the side of a building, for instance, in a favourable aspect—than when nursed as a house plant. The improvement of the Fuchsia has been for some time past nearly at a standstill, and, indeed, it would be difficult to say what more is wanted. First, we had flowers of a dark colour—crimson sepals and petals of Cactus-like hue; then blooms with red petals and

white sepals; and lastly, we have bright crimson sepals and snow-white petals! Have ever such extraordinary changes as these been found elsewhere in Flora's whole dominion, extensive as it must be admitted to be, and what may we expect next in varieties of so fickle a plant is a question which we leave to successors of the Messrs Banks and Storrey to answer.

With the Chrysanthemum, the last gem of the Floral year, we must close these remarks. In 1764, it was cultivated in the Chelsea Botanic Garden; but it was not until about the end of that century that general attention was paid to it in England. Among our nurserymen, none have bestowed so much attention on the improvement of the Chrysanthemum as Mr Salter of Hammersmith, who annually raises many fine new kinds, and to whom, if we are not mistaken, we are mainly indebted for our Pompones, beautiful examples of which have been so plentiful this season in Covent Garden market. Some Chrysanthemums, new in character, have, within these last few years, been introduced to our gardens through Mr Fortune, from Japan, and from these Mr Salter is now raising hybrids. These Japanese plants have originally large flowers, consisting of long sprayey petals, in some instances even thread-like; and the conversion of these into what florists designate well-formed flowers, is the work which Mr Salter has set himself to do. Their peculiar rich golden bronze and other coloured flowers render some improvement in their shape perhaps desirable, but, at the same time, the natural character of the flowers should not be too much altered. Some even prefer the form which they now present to an artificial one, in which the peculiar characteristics of the breed may be lost sight of, and we must say that our taste too inclines in that direction. So eminent a raiser as Mr Salter may, however, be safely intrusted with this matter.

Such are a few headings of subjects hereafter to be treated in detail, the first on the list being, as has been already stated, the Pelargonium.

WINTER TREATMENT OF IVY.

LOOKING up from our breakfast table on a recent December morning, we were annoyed at seeing one of those plagues and terrors to suburban residents, a jobbing gardener, ladder-mounted on the face of our opposite neighbour's house, stripping, with knife and shears, a fine ivy-green-clad surface, so as to leave little else than bare stems and mutilated foliage; thus not only converting what would have remained beautifully verdant for the next six months into an unsightly deformity, but risking its destruction by frost, should the predictions as to the severity of the winter prove correct. For, although a native of our northern climate, the common ivy is protected, in its natural habitats, by over-growing trees and sheltering rocks, as well as by its own leaf-covering, from the rigours of winter. And the larger leaved kinds, from which most of our best modern varieties have been derived, were originally brought from more southern and milder latitudes.

No other plant, nor combination of plants, nearly approach the ivy and its now numerous varieties in usefulness, for covering city and suburban wall surfaces, or clothing with beautifully varied perpetual foliage, shaded and pent-up garden plots, where even grass withholds its verdure during fully a third of the year. What a pity, therefore, that ivies are not more generally appreciated; and that their extensive culture should in any way be hindered or impeded by the unfounded prejudices that they are either wall wasters, promoters of dampness in wall interiors, or har- bourers of troublesome and noxious insects. Any one who will take the trouble to compare the ivy-covered surface and the bare surfaces, will find that the former is much more weather- resistant. Instead of the latter, how bene- ficial instead of hurtful the protection of the ivy has been. Nor does its supposed damp- causing peculiarity rest on any better founda-

tion; for, by the natural growth and arr- angement of its leaves, these throw the rain out from, instead of in to, the wall, and internal dampness is only slightly superinduced when, through inexcusable neglect, the water is allowed to run down the wall surface behind the ivy. As to the last named prejudice, it is only necessary to remark that ivy seems to afford a less enjoyable retreat to insects than most other plants; and were the contrary the case, that would be no reason or excuse for cutting house-covering ivy at a period of the year when insects are inert, and consequently innocuous.

The best advice we can give as to winter management of wall-covering ivy is to let it alone; and we would specially advise owners of small gardens who are dependent upon that merciless man with the spade and knife—the jobbing gardener—not to meddle with the ivy, whatever other winter dress extravagances he may perpetrate in digging down the herbaceous flowers, slashing with the bushes and trees, or doing work equally characteristic of presumption and ignorance. Nor does the winter management of ground-covering ivy require mention, save in pegging down any straggling points that are out of place, and picking up from amongst it the fallen leaves of other plants. It is no doubt advisable to trim and dress all surface-covering ivy once a year, but this should only be done in advanced spring, when the leaf buds have fully commenced to swell. Thus treated, the foliage not only retains its magnificent beautiful appearance throughout the winter, but it quickly recovers from the much marked defects that attend spring, as compared with early winter pruning.

About fifty distinct varieties of ivy are enumerated in the leading nursery catalogues, and their number becomes doubled by the admission of the so-called tree kinds, which are merely the others changed from b

ing to fertile self-supporting plants, in a transformed state the latter not only independent growing bushy shrubs, pro- g flowers and berries, but also very ently formed leaves. The creeping or ury forms are divisible into green and gated ivies. Of the first, some are ble of reaching to the tops of forest trees high walls, while some are dwarfs of a feet high, and the others vary between extremes. The leaves are scarcely variable in their sizes, while in form, ough many approach to that of the con- onal ivy leaf, others are deeply lobed it, and a few are entire, or almost so. are their shades of green less diversified, ng as they do from very dark to very

The variegated kinds, although gene- of dwarf or intermediate growth, vary y as much as the others in the size and of their foliage ; and they exhibit white yellow markings in the different forms of ed, mottled, striped, and margined ; some ie whites being also tinted with rosy le. Further, both green and variegated ties are more or less given to change in shades of colouring, sizes, and forms, rding to the soils, surfaces, and exposures ich they are grown. The so-called tree vary from under-shrub to what may be ed bay or laurel sizes ; their leaves are iably more entire, as well as oblong- ed, and they are scarcely so varied in shading or colouring. But then their ring and fruiting in winter and spring nces them above most other hardy ever- is, more especially when loaded with berries, varied as these are in colour, jetty black to golden yellow.

mong plants so diversified as these are in growth, form, and colouring,

there is large scope for selection. If it is desired to cover walls, beds, or walk- edging with perennial verdure, then, there are numerous shades of green to select from. Or, if permanent variegations are wanted to rival those of summer bedded-out geraniums, they are to be found among the gold and silver shaded, margined, and striped ivies ; while "the tree" kinds stand unrivalled among either green or variegated hardy shrubs of all sizes, for their elegance and difference of habit. Ivy may be transplanted at all times, although least successfully in the months of June, July, and August. All the primary or creep- ing forms strike freely by cuttings, and may be planted as such where they are intended to remain ; but a preferable mode with the variegated and rarer sorts is to plant the cuttings under glass, in shaded situations, and transplant them from thence when fully rooted. The tree kinds are by no means so easily managed ; but cuttings of them may also be struck, although with less certainty, and, therefore, in the nurseries they are usually grafted upon the others. Private growers, however, will often find that the most suc- cessful, as well as expeditious mode of ob- taining fine plants of them, is to plant the primary forms so as they may creep over rocks, large monoliths, or built masses of stone, walls, blocks of durable timber, &c., after covering which they will grow out into fertile bushes more vigorously than when grown from their own grafted or rooted scions.

The following article is a paper on the classification of ivies, by Mr Shirley Hibberd, being a communication made by him to the Linnæan Society, which contains information worthy the attention of all who are interested in the cultivation of ivy.

GARDEN IVIES.*

ON THE CLASSIFICATION AND NOMENCLATURE OF THE SPECIES AND VARIETIES OF *HEDERA*.

DURING the past fifteen years I have assiduously collected and cultivated the species and varieties of *Hedera*, and my collection comprises upwards of one hundred varieties (so-called), representing the three well-known types; namely, *Hedera Helix*, of Linnæus; *H. canariensis*, of Willdenow; and *H. colchica*, of Koch. Observing that many varieties were known in gardens under a diversity of names, and that those names were in many cases unnecessarily complex, and in some cases obnoxious both to sense and syntax, I determined on a complete revision of my own garden catalogue of ivies, and I now respectfully submit to the Linnæan Society a general summary of results:—

First, As to the general principles of the classification now adopted. It is based on the three species named above, the characters of which are unmistakeable. The sub-divisions comprise groups of—1. Scandent, or climbing ivies, with green leaves; 2. Scandent, or climbing ivies, with variegated leaves; 3. Arborescent, or fruiting ivies, with green leaves; 4. Arborescent, or fruiting varieties, with variegated leaves. Under one or more of these four sub-divisions may be placed every garden ivy known—a few which combine the property of climbing and the more free growth of the scandent forms, with the property of fruiting also, may claim a place in more than one group. I have, however, in every such case considered a variety known to bear fruit as arborescent, though it is capable of growing in a scandent form. The classification is based on the three species named above, the characters of which are unmistakeable. The sub-divisions comprise groups of—1. Scandent, or climbing ivies, with green leaves; 2. Scandent, or climbing ivies, with variegated leaves; 3. Arborescent, or fruiting ivies, with green leaves; 4. Arborescent, or fruiting varieties, with variegated leaves. Under one or more of these four sub-divisions may be placed every garden ivy known—a few which combine the property of climbing and the more free growth of the scandent forms, with the property of fruiting also, may claim a place in more than one group. I have, however, in every such case considered a variety known to bear fruit as arborescent, though it is capable of growing in a scandent form.

Communicated to the Linnæan Society by Shiraz, 1841.

generally well-known that every fruiting form, however arborescent, is capable of reverting back to its corresponding scandent form—the mere opportunity for climbing, as, for example, proximity to an old brick wall, and its roots having free range in a rich soil, tending to what may be properly termed its rejuvenescence. More than one variety in this collection appears to be a permanently intermediate condition between the extreme characters of the climbing and fruiting forms, producing shoots that are in some cases decidedly scandent, with large and distinctly lobed leaves, and other shoots of a more twiggly nature, with small entire leaves; these twiggly shoots *tending* always to produce fruit, but never so much as perfecting a flower-bud.

Secondly, As to the nomenclature. In adopting or inventing names for the most distinctive kinds in the collection, an endeavour has been made to harmonise the requirements of the cultivator with the usages of the botanist. For garden purposes, one descriptive name, which can be easily remembered, or, at all events, easily associated with the plant it represents, is the great desideratum. Commemorative names are simply useless as aids to identification, and geographical names are nearly useless when good; and as they are generally bad, they are also generally objectionable. *Hedera canariensis* may be cited as an example. It is the Canary Islands ivy to the botanist, the "Irish ivy" of the horticulturist, the African ivy of the traveller. The necessity of a revision of the nomenclature of ivies may be established by a glance at the present list of them. Thus, for example, *Hedera Helix* is given in the best catalogues, such as the *Hedera Helix arborescens baccifera*. Now, to say nothing about scientific proprieties, such names spread over a collection of a hundred or so varieties, constitute a painful burlesque of botanical nomenclature.

plan I have adopted makes an end of all difficulties ; it provides for every distinct kind a descriptive name, which can be put up into its proper connexions by the botanist—if the botanist will adopt it—while the use of the gardener it is valuable both as a key to the character of the plant, as well as a suggestion of its existence. To carry out my plan in its entirety, I have been compelled to assign to two out of the three species new specific designations, which I trust the botanist will allow, if only in aid of an experiment. It has for its principal objects simplicity and utility in the nomenclature of plants. The “the Canary” or “Irish” ivy is in this classification designated *Hedera grandifolia* ; the Colchican ivy, more generally known as *Rægnieriana*, is named *H. coriacea*.

As to the varieties. These, if estimated by their names, number considerably more than two hundred. After a first general revision and the obliteration of a number of most useless synonyms, there remained about one hundred kinds. These were carefully sifted and compared, the most distinctive were renamed, unless it happened that the names they already bore were deemed suitable. There remained no less than fifty varieties, entirely separated by their characters to the places assigned them in the classification. All others have been cancelled, and the collection comprises the selected fifty only.

HEDERA HELIX (Linnæus).

Known as the European ivy. The pedicels and axils are covered with white stellate hairs, six to eight rays each.

Scandent green-leaved forms of H. Helix.

major, the largest leaved British ivy ; *minor*, the smallest leaved British ivy. These are the two commonest climbing ivies in the northern parts of Europe. *Hetero-*, a beautiful variety, intermediate between the scandent and the fruiting form, but never yet flowered. It was raised from a seed at Stoke Newington. *Gracilis*, a very slender form of *H. Helix*. *Tortuosa*, a variety characterised by its twisted leaves. *Lobata*, a robust variety, with leaves distinctly

lobed. *Rugosa*, a robust variety, with corrugated leaves. *Lucida*, commonly known as *H. Helix poetica*, or the poet's ivy ; it is remarkably glossy, and the noblest variety in this section. *Nigra*, the leaves are nearly black. *Contracta*, variously known as “*Sagittæfolia*,” “*Taurica*,” &c. *Scutifolia*, a small variety, with shield-shaped leaves. *Cinerea*, known in gardens as “*Himalaica* ;” it has the most decidedly grey-tinted leaves of any in this section. *Triloba*, a small variety, almost uniformly three-lobed. *Palmata*, this is the “*Hedera Helix palmata*” of gardens. *Crenata*, the “*Crenata*” of gardens. *Digitata*, the “*Digitata*” of gardens. *Angularis*, a peculiarly angular-leaved form, which is occasionally met with, labeled “*Taurica*.” *Pedata*, an exceedingly distinct form, known in gardens as “*Chrysocarpa* ;” but as it is unquestionably a scandent form, the leaves of which will become less deeply lobed or absolutely entire when it attains a fruiting state, such a name is admissible—it belongs, in fact, to the fruiting form, and not to this peculiarly pedate kind. *Minima* has the smallest leaves of all ; in general configuration they resemble those of *Pedata*, but the two plants are quite distinct, more especially in winter, when *Pedata* has a deep green hue, and *Minima* is of a brownish purple.

2. *Scandent variegated-leaved forms of H. Helix*.—*Discolor*, the “*Hedera Helix minor marmorata*” of gardens. *Sulphurea*, a sulphur-tinted variety, known as “*Marginata canescens*.” *Chrysophylla*, a fine golden-hued ivy, which, being popular, has a multitude of garden names, the most common being “*Aurea densa minor*,” and “*Canariensis aurea marmorata*.” *Chrysophylla palmata*, a palmate leaf, with yellow variegation. *Marginata grandis*, *Marginata major*, *Marginata media*, *Marginata minor*, *Marginata rubra*, a group of five distinct and beautiful varieties, the leaves of which are margined with creamy variegation. The last in the group acquires a deep red tint in winter. The names by which these five are severally described in garden catalogues are sufficient in number to serve for fifty varieties, and sufficiently ridiculous to be unfit for any. “*Hedera Helix minor marmorata Cullisii*,” the garden name of the

now designated "*Marginata rubra*," affords an example of the necessity of a thorough revision of the names. *Submarginata* is the last in this section; it is characterised by a line-like whitish margin. The five constituting the *Marginata* group proper, have broad band-like margins.

3. *Arborescent green-leaved varieties of H. Helix*.—*Baccifera nigra*, the common fruiting form of *H. Helix*. *Baccifera nigra crenata*, a wrinkled-leaved variety of the last. *Baccifera lutea*, the yellow-berried ivy. *Baccifera alba*, the white-fruited ivy.

4. *Arborescent variegated-leaved varieties of H. Helix*.—*Argentea major*, a remarkably fine variegated tree ivy. *Argentea minor*, similar to the last, but with smaller leaves. These are counterparts of the *marginata* varieties in section 2, but as they cannot be placed in that section because of their *arborescent* character, they are not regarded as *marginata*, but as *silver-leaved ivies*, and thus their names separate them from the group to which, by their colours, they are closely related. *Sub-lutea*, the counterpart in a climbing form of *Sulphurea* in section 2. *Aurea*, a splendid variety, with rich golden variegation, counterpart in a climbing form of *Chrysophylla* in section 2.

HEDERA GRANDIFOLIA (Hibberd).

The large-leaved African ivy. *H. canariensis*, of Wildenow, *H. hibernica*, of gardens. The pedicels and calyx are covered with white stellate hairs, which have from thirteen to fifteen rays each.

1. *Scandent green-leaved forms of H. grandifolia*.—*Grandifolia*, the common Irish ivy. *Viridis*, "*Algeriensis*" of gardens, the leaves light green, with cuspid lobes, pear-shaped; usually regarded as a species, but undoubtedly the Irish ivy, and is termed between the two. *Canariensis*, of gardens, of habit

2. *Scandent variegated-leaved forms of H. grandifolia*.—*Variegata*, a new, scarce, handsome variety, the glossy leaves richly margined with primrose yellow. *Pallida*, well known in gardens as the "golden blotched" ivy. *Maculata*, a fine variety, the leaves of which are uniformly blotched and spotted with yellowish grey variegation. *Canescens*, known in gardens as "*Algeriensis foliis variegatis*."

3. *Arborescent green-leaved forms of H. grandifolia*.—*Arborescens*, the common fruiting form of the Irish ivy. *Cordifolia*, a variety with thick-textured cordate leaves. *Cuspidata*, a tree-like variety, with cuspid lobes.

4. *Arborescent variegated-leaved forms of H. grandifolia*.—*Flava*, a fine variety, with rich yellow variegation. *Striata*, the leaves striped and blotched with yellowish creamy variegation.

HEDERA CORIACEA (Hibberd).

The thick-leaved Asiatic ivy. "*H. colchica*," of Koch, "*H. Rægneriana*" of gardens. The pedicels and calyx covered with two-lobed scales, the lobes divided into seven to ten segments.

1. *Scandent green-leaved forms of H. coriacea*.—*Coriacea*, known in gardens as "*Rægneriana*" and "*cordifolia*."

2. *Scandent variegated-leaved forms of H. coriaceae*.—Hitherto I have not met with a variegated form of the thick-leaved ivy, nor has a single variegated leaf occurred amongst a number of plants that have been submitted to every imaginable variety of treatment.

3. *Arborescent green-leaved forms of H. coriacea*.—*Dendroides*; this name is adopted to distinguish it from the *arborescent* form of *H. grandifolia*. It is a remarkable ivy, resembling in growth a *Rhododendron*, or an evergreen *Cerasus*, more than any ivy of the trailing type.

4. *Arborescent variegated-leaved forms of H. coriacea*.—None.

The Stable.

ANTIQUITY OF HORSE-SHOEING, WITH REMARKS ON THE PROGRESS OF THE ART.

BY JOSEPH GAMGEE, SEN.

AFTER the establishment of the first Veterinary College in France, thirty years elapsed before that example was followed in England; and it is to the state and progress of farriery among ourselves during that period, that I purpose taking some notice now. We lack a literature on the subject by which it could be traced for any long period in this country with the same accuracy that it has been among some Continental nations. However expert and susceptible of improvement English working farriers were, we were greatly behind in such necessary mental aids as written instructions and reports are alone capable of supplying.

But, happily, just as France was leaving us behind by well sustained strides, under Bourgelat's directorship of her veterinary schools, appeared George Stubbs—not, indeed, with the same kind of training in all details of the farriery art as Solleysel and Bourgelat displayed, but as a man whose high standard of merit cannot be adequately estimated.

The great work, great in size, but greater in worth, of George Stubbs, on the "Anatomy of the Horse," was published at London in 1764; and both the work and its author are so often referred to by writers in all subsequent time, that it would be needless to dwell for a moment on either, but for the claims the memory of such men retain on posterity, forming, as it does, an epoch in the history of an important art. One can hardly contemplate the brilliant and diverse talents of two such men as Bourgelat and George Stubbs, working for similar ends, in the prime of life, at the same period,

without wishing that their labours had been conjoined; only that national pride would induce the country of either to lay claim to both.

It is important to impress on our minds the date of publication of Stubbs's work, relative to that of the inauguration of veterinary schools in France. The appearance of the work occurred three years after the opening of the Lyons Veterinary College, and one year before that at Alfort. Therefore, considering the length of time it must have taken Stubbs to educate himself, and produce such a work, we perceive that the whole was accomplished without the means a veterinary school could have afforded, and before any one existed. While exulting, that amidst the dearth of talent that prevailed, of the kind, England claimed among one of her sons, the greatest man of the age in his sphere. But our exultation is not unassociated with regrets, for Stubbs was not rewarded in his lifetime, and his work was plagiarized, and supplanted by trash, to its almost entire exclusion from the sight of students.

The knowledge of anatomy was the great requirement to advance the art of horse-shoeing in England; manual skill was not wanting, and it was by the combination of all necessary knowledge that the art had been brought to proficiency on the Continent; and the same means were required in England. That want was supplied by George Stubbs in the most masterly manner. Those who, in our early years, tried to damage the work by bland praise, used to say that the author was more of an artist than anatomist; the fact being, that those smatterers were

incapable of discerning any of the highest merits of the work; and that Stubbs, like Roger Bacon, was immeasurably before the men of his age in his sphere. That splendid original work—alike philosophic and artistically correct—was pounced upon by plagiarists, whose worthless productions were puffed into notice—to the neglect of the really instructive masterpiece.

The next English work on the horse, in the order of time and merit, appeared in 1771, "The History and Art of Horsemanship," by Richard Berenger, Esq., gentleman of the horse to His Majesty. This large work, in two volumes, though in no strict sense treating on farriery, is one of those collections of knowledge on horses, of all times and countries, such as no man aspiring to thorough knowledge of them, and whose field of industry lies in their management, can fail to acquire instruction, if he seeks it, in Berenger's work. Not to attempt to give an account of all the books on farriery that appeared in England, within the period under consideration, two others require to be mentioned. Earl Pembroke's little volume, on "Military Equitation," like the last work noticed, is in reality a book on the horse; and though ostensibly devoted to riding, the noble author discussed the system of management in states of health and disease, and in no insignificant way on shoeing. He was thoroughly alive to the prevalent defective state of that art, and gave utterance, both loud and lucid, in calling for reforms.

More within the sphere of this inquiry is Mr Strickland Freeman's work on the "Foot of the Horse." This book was unexampled among monographs on that subject, in

the way it was illustrated; and though it did not set forth any obvious practical advance on horse-shoeing, the author's chief aim—the importance of the art—was canvassed so earnestly, after the manner of Lord Pembroke and the great French contemporary, Bourgelat, that Freeman's work might have been expected to have led to new ardour and practical results, favourable to progress in good methods of shoeing. Such expectations were the more reasonable, since some of the anatomical descriptions and illustrations of the horse's foot, drawn from dissections made by one of the greatest anatomists of the time, by which combination of talent phenomena were brought out, not before noticed, and which were at first ignored and afterwards tacitly contradicted, or rather set aside by most erroneous descriptions of some parts which Freeman so correctly made out and clearly described—I allude in particular to the horn-covering of the frog, and the part which Mr Bracy Clark afterwards called the coronary frog-band or *Periople*.

Freeman's work, however, appeared at a time when the establishment of a veterinary school at London was in contemplation; and therefore, with the projected order of things, the new work, its excellences notwithstanding, was little patronised, and at length doomed to be shelved to make room for others.

Those who succeeded to the teachership of horse-shoeing in England, despite the examples set by Continental brethren, dismissed to the greatest possible extent all that was found relating to it, both of men and things, and a new order, and new-fangled ideas and plans were inaugurated.

REARING, FEEDING, AND MANAGEMENT OF CART HORSES.*

BY MR COLSON.

IN his introductory remarks the writer said that one gentleman told him that his horses had had no corn since harvest, and he therefore argued that his must be the cheapest way. He knew also of one gentleman whose horses had been kept on mangold and hay since he got his mangold off the ground. A horse would eat 10 or 12 bushels of mangold a-week, and if they estimated the value of that at 16s. a ton, there being 40 bushels in a ton, the cost for mangold was between 4s. and 5s. a-week. That was as much as corn, and when the cost of hay was added, he thought it would come to as much as the corn and hay which he used. A horse would eat about $1\frac{1}{2}$ cwt. of hay per week, which, taken at 2s. 3d. a cwt., would come to 3s. $4\frac{1}{2}$ d. He put the hay at 2s. 3d. a cwt., because he considered that was its value to consume on the farm, and if they were to put it at the selling price, 4s. 6d., he thought that would not be fair. He knew another gentleman who fed his horses with 5 stones of bean-meal, at 1s. a stone, and 2 stones of maize, at 11d. a stone, making a total of 6s. 10d. a-week. He should take this statement from the 1st of September to the 1st of June (forty weeks), which amounted to £13, 13s. 4d.; add to that $1\frac{1}{2}$ cwt. of hay per week, at 2s. 3d. per cwt., £6, 15s.; and supposing the gentleman had vetches for his horses twelve weeks, at 7 rods per horse per week, that at 6d. a rod would be £2, 2s. If they had to buy vetches, he believed they would have to give 1s. a rod, but for a farmer to consume on the land, he thought 6d. was a fair price. The total cost for a year upon this system was £22, 10s. 4d. Another gentleman kept his horses on 5 stone of beanmeal per week, with a bushel of bran, the meal and bran being worth 5s. 9d., which, for forty weeks, would be £11, 10s., to which the hay must be added as before, £6, 15s., and the cost of sending the horses out to grass twelve weeks, at 3s. per week; and this brought the total cost, under that system, to £20, 1s. He, however, thought horses in a meadow did more harm than good. He next came to his own system, which he had adopted for thirty years, with very satisfactory results. During the seventeen weeks of October, November, December, and January, he gave them oats, value 5s. per week, £4, 1s.; hay during the same period, $1\frac{1}{2}$ cwt. per week, £2, 11s. In February and March, eight weeks, he gave them oats as before, 5s. per week, £2; and instead of hay he gave them

half-a-peck of meal at night, because he had not hay enough, at a cost of 4s. a-week, £1, 12s. In April and May, oats 5s. a-week for nine weeks, £2, 5s.; hay in the same period, £1, 7s. June, July, and August, vetches night and day for thirteen weeks, 7 rods per week, at 6d. a rod, 3s. 6d. a-week, £2, 5s. 6d. September, four weeks, 3 bushels of bran per week, 11s.; clover and grass, 2s. per week, 8s. This made a total cost for the year of £17, 4s. 6d. He always gave his horses a month on bran at harvest time, which was as good as medicine, and a plan that kept the doctor out of the yard. He had not had the veterinary surgeon in his yard for his horses since harvest, nor for several months before, and he believed his way of feeding them would keep them in health. He considered oats and hay the best thing to feed horses upon. He had now completed his task. He hoped there would be plenty of opposition, so that they might arrive at the point they all wished to reach, viz., how they could keep their horses in the cheapest way. During the twelve years he was at Icklingham, he never lost but one horse, and that was from inflammation of the lungs. He was at the house of a gentleman the other day who had a great deal of tail barley, which he would not sell, because the price was low; he had it ground, and gave it to his horses, and lost three valuable animals. If they had been fed with oats, he (Mr Colson) did not believe one of them would have died.

DISCUSSION.

In the course of the discussion which followed the reading of this paper,

Mr GAYFORD observed, that there was no doubt a great deal in uniformity and regularity of feeding. His plan, and the plan of his father before him, was to give a little bran in the harvest time. His horses were regularly worked, fed, and watered, and it was very essential to give them food easy of digestion. It was also, in his opinion, highly important for farmers to look after the horses themselves. As to the use of beet, he thought, in the spring time, when the weather was a little warmer, a few beet might be advantageously given as a kind of corrective. He believed that these roots acted in much the same manner as did the early grass. However, he should only give the horses the beet in moderation. If men were allowed to run to the clamp and help themselves, as it were, *ad libitum*, the horses would be likely to become ill, and it was well known that men used no moderation under such circumstances. He believed it right to give the horses a few, putting roots in the manger whole, with

* Paper read before the Lavenham Farmers' Club.

a little chaff, letting the animals crush them for themselves. To give horses a good number of beet at this season of the year, before they were ripe, must have undoubtedly a bad effect. With regard to the economy of Mr Colson's system, he (Mr Gayford) was not quite sure whether it was advisable to change according to the market or the prices of the produce; but he had heard many practical men say that the farmers could not do better than adopt one system and stick to it, whether the food was cheap or dear, for, in the long run, they would be as well off.

Mr THOS. KING said, to begin with, he always selected the best animal he could purchase, an animal with a good constitution. He fed his horses according to the work. During harvest, he gave them a fair quantity of corn, and directly after harvest, he gave them what he thought they really required, to go through the work. He had been in the habit of giving them a bushel of oats, and of maize and beans broken together, and all the hay and stover they liked, and he worked them as hard as he could. In fact, nobody worked horses harder than he did. In regard to the use of mangold, he thought a few were useful in the spring time. He considered that Mr Colson was quite justified in not putting the hay at the price it would fetch, if they were allowed to sell it. Very few were allowed to sell the hay, and, therefore, it ought not to be estimated at the market prices; but the same ought to be said of mangold also. As to the use of bran in the harvest time, it might be all very well; but, for his own part, he never gave his any. He did not know that they required it, for he was in the habit of turning his horses out at night. During the summer he had vetches for them, or green clover. He liked the old system of keeping and attending to horses, with a manger and rack in the stable. He had been told that there was no better way than having horses baited in the stable, and having a bit of stover put into the rack to keep them in health. He liked to have good sheds for the horses to go into—sheds well sheltered; but let the animals be first baited in the stable, and then turned into this shed. When they went into the stable from the yard, they relished the food much better than they otherwise did. By turning them into the yard, they would stand the weather much better, and the wind to blow upon them. He did not think there was anybody who lost fewer horses than he had; and his father lived until he was 75 years of age, and he lost only one horse whilst he was in business.

Mr. King then expressed his regret that he was not a breeder of horses, but that he was not a breeder of horses himself. He must differ from the gentleman who had produced the following statement:—

having shewn that he could keep horses for 6s. 6d. per week per head. He (Mr Hawkins) was sure it cost him on the average nearly 12s. per week. He had put figures together on several occasions, and he found that the amount came to considerably over 10s. a-week. He thought a farmer should put his hay and stover at what he would have to pay on a fair valuation. This, in his opinion, was the soundest principle to go upon; and, putting all things together, he could not keep his horses for anything like the amount named by Mr Colson. He did not believe in giving bran in harvest, and after harvest, for, particularly on heavy land farms, that was a very important time, and horses ought to be kept well. The horses were pushed about in carting, they had late hours, and there could not be that attention given to them in the morning they required before they commenced work again. It was highly important that horses should be well fed with corn at such times. If horses were let down before Michaelmas on heavy land, it was impossible to get the work into a right condition. He believed Mr King was nearer the mark in giving his horses 2 bushels of corn, and all the hay and stover they liked. As to the use of mangold, he (Mr Hawkins) had been in the habit for years of using certain quantities. An instance had been referred to, in which a farmer had given his horses as many as 12 bushels a-week; he should not think a horse could eat that quantity for long. The horses in Essex were kept very much on mangold, and they never gave them more than 6 bushels per week, and that was too much. He was in the habit of putting the roots through the mincer, and mixing it up with chaff, and he found that the horses licked it up, and they did very well upon it. He did not find this food relaxed the horses, and it was useful in preserving the hay and stover. When men were allowed to run to the hay and stover stack, there was no holding them, and they would make use of them indiscriminately and indiscreetly. Many gentlemen did not allow the use of stover, unless it was trussed, and in this way each horse had a certain quantity per week, and this was certainly an excellent mode of management. The better a man kept his horses, and worked them accordingly, the more likely was he to keep them in health. Mr King had stated that his losses had been very few. It was well known that that gentleman was one of the best of horse-keepers, and one of the best salesmen. Mr King kept them until they were in good condition, and in good working order, and he got rid of them before they became a sinking fund on the farm; and in this way he was always in a good position to have his work done.

After some further discussion, a vote of thanks was passed to Mr Colson for having introduced the subject, and the meeting adjourned.

The Dairy and Poultry-Yard.

ON SOME POINTS IN BUTTER MAKING.

HERE is butter *and* butter; that is, there are its good and its bad qualities. Sometimes, indeed, butter is not butter at all, merely a conglomeration of stuffs, as lard, tallow, fat, &c.; in fact, a “nicely manufactured article” to meet the wants of sundry

in this manufacturing and adulterating. But with butter of this sort it is not our purpose to deal, but with butter which, whether it be good or bad, is really the thing it professes to be. Much of the quality of butter, indeed we may say all of it, depends upon the way in which it is made.

The same milk two dairymaids will produce two vastly different products. Both will be good when first made, so far as regards taste and appearance; but while one will in the course of a few days be rancid and the other will keep for a long time sweet and good. The flavour of butter is, no doubt, much influenced by the kind and quality of food on which the cows are fed. We all know from experience, how disagreeable is the flavour of turnips in butter; yet this can be almost entirely avoided, or rather prevented, by taking care not to give the turnips

to the cows just before milking, but only some time and immediately after, milking is done. Again, a bad flavour, even still more offensive than that of turnips, is given to the butter by having dirty vessels. The utmost cleanliness in cleanliness is demanded of a dairymaid; for there seems to be no butter so easily tainted as milk. Taints, however, can be conveyed to milk through the pores of the atmosphere; hence, it is necessary that the dairy should not be placed in a room where foul odours can gain access. And it is needless to say that it is also

an essential that the dairy itself—in floor, walls, and benches—be kept most carefully clean. Hence, appliances for easily obtaining and using water are necessary in all well-designed dairies.

There are very considerable differences of opinion as to whether butter is best made from the whole milk or from the cream alone. We believe the best is obtained from the cream. But this mode of working involves more care than the making of butter from the whole milk; while, on the other hand, it has this advantage, that the working of the churning process is easier, as there is a much less bulk of material to operate upon. A great deal of discussion has been given to the question, What is the best form of dish in which to set the milk to cream; a deep or a shallow one? Upon the whole, the evidence is more in favour of a shallow than a comparatively deep one—we say comparatively, for a vessel of great depth is entirely out of the question. The best material for the vessels is unquestionably glass; the next best, glazed pottery ware; we do not approve of wood vessels, as, even with the greatest care, they acquire a taint; zinc has been recommended, but it should be avoided. The worst feature connected with glass and pottery vessels is their liability to be broken; but we would recommend the plan of not fining the dairymaids for breakages, or making them pay for the articles broken, but rather to give them a small premium for every vessel not broken in the course of a season. Where this system has been adopted it has worked with admirable success; which, indeed, need not be wondered at, seeing that it is based upon a sound knowledge of what human nature is.

POULTRY-HOUSE.

THE designs for poultry-houses have been so numerous, that their name may be said to be "legion." Poultry-houses of all kinds, small, middle-sized, and large; poultry-houses simple and cheap, others complicated and dear—designs so numerous, that a large book might easily be filled with only a selection of them. The Americans have probably paid more attention to this department than we have with probably the exception of the French, who have been prolific in designs for poultry-houses. The following is a design published in America, which, with its accompanying description, presents some features of novelty:—

The posts of the frame, if built of wood, may be not over 9 feet high, by resting the sills on concrete walls of 3 feet, where it is convenient to build on a slight

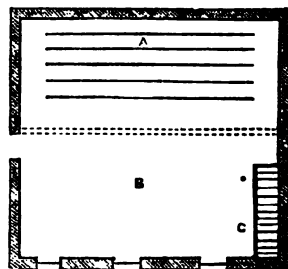


inclination. $7\frac{1}{2}$ feet in height will do for feeding-room and the manure-pit, which may be formed by running a concrete wall 3 feet high, as shewn by the dotted line. The manure may be thrown in through the door, which opens near. Three windows on the south side will give light and warmth.

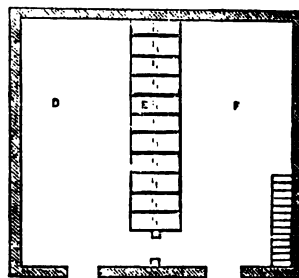
The second floor may be lathed up the roof, to give sufficient height in the centre, which will be $4\frac{1}{2}$ feet under the eaves of the roof. The nests are set in the partition, 1 foot from the floor, 1 foot high, and $1\frac{1}{2}$ foot long, open at both ends with a slide door, which is reversed when a hen is sitting, so that she is placed in the opposite or sitting room, and thus the other

the rooms and windows in the end and south side will give sufficient light and warmth. The whole should be lathed and plastered, or may be constructed of concrete walls, which will make a warmer and more durable building.

This plan will give for 80 feet of outside wall 800



feet floor, and while the lower floor is much the best for roosting and feeding, the hens quite readily ascend to lay and sit, and with equally good success. I find this room sufficient to winter 100 fowls, by having liberty to roam at large in pleasant weather, and con-



SECOND FLOOR.

fining in a yard during the season when they are destructive to growing crops. The cost will vary according to prices of material. One hundred bushels of shell lime would be sufficient to concrete the walls, with small stone and gravel.

The Naturalist.

WINTER FOOD FOR WILD FOWL.

THE Capercalzie, or Cock of the Wood, which, about thirty years since, was successfully re-introduced to the Scottish lands by the last Marquis of Breadal, not only abounds at the present day in Taymouth plantations, but has spread throughout the wide range of the Grampians, adding on the south not only to the fir plantations in the "Howe of Strath-" but even to those of Fife and Kin-hires; while, northward, its cry is again heard in those parts of Inverness and Ross, where the last remnants of its former range disappeared. So rapidly, indeed, has its reproduction, and so speedy its occupation of the Scottish woods, that the question, how did it once become extinct? is difficult of solution; more especially, seeing that this happened at a time when the native fir forests were far more extensive and secluded than they are at the present day. It is a popular belief that the Capercalzie depends almost entirely on the buds, leaves, and shoots of the fir for its food, and this is in some degree confirmed by the strong resinous-like flavour of its flesh. Hence its increase is beginning to be looked upon with alarm by some plantations owners, lest they may have got as troubled by a pest for the destruction of their grown-trees, as rabbits have long been to these in their younger stages. In confirmation of these fears, the thick fall of young spruce fir twigs under old trees, is pointed to, and held to be conclusive evidence, against the mischievous doings of the Cock-of-the-wood; when they might almost invariably be more correctly attributed to that older and more destructive enemy of these and many kinds of trees, the common squirrel.

With the view of ascertaining in how far this most stately of wild fowl is actually guilty of fir destruction, we have carefully examined the supposed evidences of his mischief, more especially in the fallen twigs of spruce, which are often so thickly strewn as almost to cover the ground, and have invariably found the squirrel to be the aggressor, as evinced by the teeth marks in cutting into, and eating out the thickened softish central tit-bits at the junction between the old and young growths; whereas wild fowls tear or break the shoots into irregular pieces, commencing at the points and proceeding inwards. Having, in March last, learned that at Anderson's Royal Emporium, Edinburgh, large importations had arrived of wild fowl, which had been trapped in Norway during the month of February, we applied for and were kindly favoured with the crop contents of a well-filled Capercalzie, a Black-cock, and a Ptarmigan. Those of the first were, when gently pressed together, sufficient to fill an ordinary-sized breakfast cup; and fully more than the half were broken fronds of that commonest of evergreen ferns, the *Polypodium vulgare*, some pieces, from the points, being fully three inches in length. About two-fifths of the remainder consisted of shortish Scotch fir leaves, with three pieces of shoots among them, none of the woody parts of which exceeded half-an-inch in length; one had two terminal buds; another, one; the third was broken off at both ends; and there was also a largish loose bud. About one-fifth consisted of juniper shoots and leaves, the largest shoot being fully an inch long; and there were also four green juniper berries. Next bulked sixty-six pieces of blaeberry or bilberry shoots (*Vaccinium myrtillus*), ranging

from about a-quarter to an inch and a-half long. Then fifteen broken and entire leaves of the evergreen *V. Vitis-Idæa*, which produces the so-called Russian cranberries, so largely imported from the Baltic. There were also four pieces of the common heather, the largest about an inch and a-half long. The remainder consisted of a partly withered trifoliate leaf, seemingly of the strawberry-leaved cinquefoil (*Potentilla fragariastrum*). A cluster of three undeveloped male catkins of the common birch; and five small angular quartz pieces of gravel. In September last, we were favoured with the crops of two Capercalzie which had been shot in the extensive low-country fir plantations of Meikfour, in Perthshire. One of these was compactly filled with more or less torn leaves and a few buds of the native Aspen poplar (*Populus tremula*); while the other was as well filled with leaves of the common larch, among which were a few side buds having their verticillate bundles of leaves adhering; no Scotch fir leaves being found in either. But that they occasionally aspire to more dainty fare was evinced by the crops of seven birds imported from Norway, in October, being filled with the so-called cranberry, or fruit of *Vaccinium Vitis-Idæa*.

The Black-cock, received with the above in March, manifested its well-known predilections for the common juniper, its crop containing no fewer than 684 green juniper berries, many of which had a leaf or two, and a few had small leafy shoots adhering to their base; there were also three half-inch long shoots, fully clothed with entire leaves, and 160 leaves either singly or in pairs; further, there were three leafy Scotch fir shoots, the largest being about two inches long, twenty pair of almost entire, and about the same bulk of broken leaves. Then 12 twigs of aspen, from a-half to an inch and a-half in length, and 32 broken and entire leaves of the *Vaccinium Vitis-Idæa*, some of which had small leafy shoots adhering, and a few were like the Scotch fir leaves, having the cranberry leaves

The Ptarmigan exhibited in the contents of its crop a very different kind of feeding from either of the preceding: these mainly consisted of 312 entire and broken male catkins of the dwarf mountain birch (*Betula nana*), a few of which had the points of their shoots attached, and some pieces of shoots were without catkins. Next in bulk were 34 twigs of the crowberry (*Empetrum nigrum*). Then 19 juniper berries, but no juniper leaves. Twenty-one almost entire leaves of the *Vaccinium Vitis-Idæa*, which were smaller in size and narrower in proportion to their length than those of the same species in the two preceding, shewing that they had been grown at a higher altitude. And lastly, two twigs, each fully an inch in length, of the small Alpine willow (*Salix herbacea*). We may here remark, that the crop of a Ptarmigan, previously received from Iceland, and which was supposed to have been killed in November, was found to be almost exclusively filled with small twigs of this miniature willow, which naturally abounds on the higher parts of all our Ptarmigan frequented mountains.

From the preceding enumeration of crop contents, it is evident that, in the selection of its food, the Capercalzie is a bird of varied tastes, and that it does not feed on the fir tribe so exclusively as is generally supposed; hence it is unfair to blame it for doing great injury to plantations of Scotch fir, or of other Coniferæ. In the juniper, requiring over a whole year to mature its berries, an important source of winter food for Black-cock, and some other wild fowl, is provided; hence, juniper growth should be encouraged wherever their presence is deemed desirable. The proprietors of high mountain ranges, who may be desirous of promoting the increase of Ptarmigan, would do well to propagate that rather rare native plant, the *Betula nana*, extensively; seeds of which, in the absence of home supplies, may be had in any quantity from the uplands of Norway and Lapland.

The Country Gentlewoman.

LETTERS TO FARMERS' DAUGHTERS.

KEEPING in mind the good old chivalrous maxim, "*Place aux Dames*," we endeavoured, as our pages of late evidence, to give due prominence to the wants, the wishes, and the welfare of wives and daughters of the farmer's household. What success we have had, we will best be able to say; and whatever our verdict, we are quite disposed to abide by it. We have, at all events, tried to tell, and after all, trying is only beat by doing. The arrangements we have made to run this column in every way what we are anxious to make it, and which its importance entitles it to, are, we think, fairly complete. The following is the first of a series of letters addressed to farmers' daughters which have lately appeared in the *American Cultivator*, and which contain much that is exceedingly good and suggestive. Without further preface we here present it:—

I.—LITTLE THINGS.

"There is a little and there a little."
"Thinking is great or little, only to mortals' thinking."
"That scrutinizes trifles, hath a store of pleasure in his hand."

MY DEAR GIRLS,— . . . Brought up by a farmer's daughter, and later a farmer's wife, the writer cannot but know something of the cares and annoyances, as well as pleasures and delight, of the farm household. To aid you in viewing rightly your duties, privileges, obligations, and necessities, in life's varied departments, is my present object; so with a cordial greeting, I propose to talk to you in this letter about "little things."

Our lives are remarkable for great things, we are made rich, and fruitful, and blest, by our duties well performed, little joys oft

repeated, little troubles beaten off before they sting; or life may be to us poor, and barren, and wretched, by little cares neglected, little kindnesses omitted, little sorrows nursed, and little pleasures unappreciated.

It is only by the "here a little, and there a little," of patient study, between times, that many in your position attain mental culture, or find time for personal and home adornment, for the cultivation of those tastes peculiar to woman, and by the neglect of which she does her home, her parents, brothers, and husband, a cruel wrong.

A little hour, wasted yesterday, might have carried a sunbeam into the darkened room of some pale sufferer, or renewed strength and courage to some over-burdened neighbour.

Perhaps some eye may scan this page, to whom life seems but one weary round of trifles; to whom the days are but a treadmill of unappreciated, unrequited labour. To such I would say, fight against despondency: look up, and count the stars set in the dark of your sky; resolutely treasure the little blessings of existence, and never forget to "commit thy trifles unto God, for to Him is nothing trivial."

Finally, if I had a voice that could reach girlhood, in its wide realm of promise, I should say that its *first* work is to form a fitting character, with which to do the great work of woman. Meanwhile, dear girls, collect your precious "*little things*," in the shape of minutes, words, efforts, tastes, &c., and sum them up, if you will. If not, know they are recorded on high, for good or ill, for joy or sorrow.

Truly yours,

T. S. H.

II. EDUCATION.

MY DEAR GIRLS,—Education, strictly speaking, covers all we owe our Maker, the world, and ourselves. Nature, experience, reason, duty, and affection, are our teachers. Few are educated aright. That which is obtained in our organised schools, and from hired teachers, and printed books, is as a rivulet to the ocean compared with the numberless outside sources, bringing their pressure to bear upon the intellect and character of these life-students. There are many who are longing for opportunities, who are wasting precious months and years in neglect of the educational sources about them. *Nature* is a kindly teacher, and rich in resources for the unfortunate.

What lessons of strength, endurance, and beautiful patience, may be learned at the bedside of a sick mother, or tending a fretful child, or in the heat and toils of the kitchen!

What scope for tact and lady-like culture, to fill well and cheerfully such hours as these—stepping with ease from these to do the graceful honours of the tea table. Ah! one may learn much and fast in such a school as this!

The majority of young women chatter like magpies, but cannot talk soundly or forcibly. When a woman will cease to trifle, and deliver herself from the barbarous rule of Fashion—when she will become a solid *thinker*, and, with the key of knowledge, unlock the doors of practical wisdom—when she wakes up to the interests of human progress,—then, and then only, will men cease to speak of her “inferior” powers.

Nor is this all; young women should have some one paramount object in life. A lady says, “I am going to be a merchant or lawyer or a carpenter,” and she has no other influence

should educate herself with some *distinct* purpose of usefulness and independence. To be dependent is degrading—even upon husbands, parents, or brothers, except in case of accident or illness. What you are doing daily, whether it be study, housework, needlework, ornamental or plain, let it be done thoroughly and well. Understand all the secret and practical bearings of your work; and alongside of to-day’s duties ever be strengthening your grasp upon the main object which you have placed before you, to acquire independence and a distinctive place.

Women are naturally the best managers in the world; they are prominent for tact, ingenuity, and putting the best foot forward. Oh! my dear young readers, waste not your gifts on trifles.

There is one department of educational culture of which I have said nothing, deeming it worthy a separate letter. No young woman is educated until she understands the *laws of health*, and no amount of intellectual and moral training will fit her for life’s duties if her knowledge is confined in a sickly, shattered frame.

This entire subject is so vast and beautiful a theme that the pen and thought would gladly linger past the writer’s limits. Remember, as mother, wife, and daughter, woman wields a sceptre of wondrous power and beauty. To wield this sceptre as is befitting, you must educate yourselves to greater vigour of body and mind. Be strong in will, thought, and action. Be stout hearted; but always *womanly*. A high toned writer says upon this subject—“If the world were mine, and I could educate but one sex, it should be the *girls*. Strengthen the woman heart, and you strengthen the world. Give me a nation of noble women, and I will give you a noble nation.” Truly yours,

T. S. H.

THE COUNTRY GENTLEMAN'S MAGAZINE

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THE IRISH LAND DIFFICULTY.

LARGE AND SMALL FARMS.

IF stated at the conclusion of our last article under this heading, that the marvellous improvement—for it is neither more nor than this—which the last decade or has witnessed in agriculture, was owing to the extension or continuance of the small farm system, but, on the contrary, altogether, to the development of the large farm system. It is by no means difficult to prove this; indeed detailed proof is no means necessary, a very slight consideration of the whole circumstances of the case will shew that it must have been—could in any way be otherwise than so. No doubt what may be called the romantic side of popular feeling, and of popular expression of that feeling, is all on the other side. No doubt it is a pleasing picture to have before one of a large body of small farmers, the cottiers and the yeomen of old as existing amongst us; of each sheltered under the shadow of his own roof tree, eating the fruit of his own labour, if not sitting under his own vine and fig tree—at least cultivating the soil on which he eats with his own home-fed corn. But the question, apart from all romance, and brought into the regions of practical consideration, really is, what system is most likely to yield the most practical results, far as the welfare of the nation is concerned, which requires large and continuous

supplies of food? Now, merely taking a *prima facie* view of the case, without at present going into statistical details to prove it, which system is the most likely to yield this large supply of food?—that which can bring to bear upon it all the resources of capital and skill, by which the maximum of produce is obtained from the minimum of land; or that in which all the workers are themselves labouring under the continual pinch of want of means to improve their holdings, with whom the “stern necessity to live” is the main point which is continually pressed upon their attention—a necessity so clamant, that matters are considered to be well with them if they can continue to live out of their farm. Taking this merely *prima facie* view of the question, the answer is obvious, and there is only one answer to it, and it is this, that the small farm system is not the one adapted to meet the requirements of the nation. To return to the time when small farms were numerous in this country, would be virtually to put back our agricultural progress a hundred years. To shew what would be the result, we would refer to one pregnant sentence—and only one out of many there given—at the close of the paper read by Mr James Howard, M.P., before the Central Farmers’ Club, and which was given *in extenso* in this paper. And surely no one who knows what Mr Howard is can say that he is not a practical man, or one unacquainted with the subject upon which

AGRICULTURAL STATISTICS.

TATISTICS," what a horror the very mention of the word, however faintly lated, conveys to all but the driest of dusts! It is even more repulsive to up people generally than simple arithmetic to the schoolboy, as described in a e, that must have been written by one of "shining morning-faced" ones, who, satchel on back, crawled along "like unwillingly to school"—

"Multiplication is a vexation,
Division's twice as bad;
The Rule of Three, it puzzles me,
And Practice puts me mad."

if in the single word "statistics" there is or, it is terribly intensified when the word "agricultural" is prefixed. "Inquisition! of rents! ruin!"—all these calamities to ers were comprehended, or supposed to n these two, it must be confessed, rather breaking words. Nobody had any right now how many acres you farmed (that indeed, might be learned, but no reason occupier should tell it), far less to be ainted with the different kinds of crops vn upon the land, and the proportions in h these were grown; and "horrors on ors accumulate," to seek to ascertain the t number of "woolly people" cropping r hilly pastures, or eating in your folds, the cattle grazing in your meads or feed- in your stalls. Monstrous! Were such gs revealed, the tax-gatherer would be n upon you with heavier assessments, the llord would make these statistics a pre- for raising the rents, and the public ically would get an insight into your pri- concerns. No longer would the Eng- yeoman's house be his castle; it would pento the most obnoxious of callers. Shall men, whose ancestors successfully red the imperial and imperious demand of rles I. (although the pecuniary amount ch called forth Hampden and Cromwell

was small), submit to the domiciliary visits of policemen with schedules. Perish the thought! We shall not tell our acreage, nor the kind and quantity of crops that are raised there- upon; neither shall we enlighten others as to the number of our sheep and our goats, our oxen and horses. *That* knowledge is exclu- sively our own, and we shall not be coerced or cajoled into making it known.

Such or such-like were the sentiments that pervaded the minds of the large majority of farmers when the subject of agricultural statistics was first broached by far-seeing people a great many years ago. They never looked at the otherside of the question at all; apparently never wished to comprehend the fact that for the little information they themselves supplied they would be compensated a million fold; that by casting in their own mite they would become equal participators in the whole wealth of the treasury; that they would thus see the exact condition of the country, and so be enabled to buy and sell with far greater precision and chance of profit; that they" would, in short, be no longer groping in the dark, but walking steady and erect in the full noon-tide blaze. But no, no! Statistics to them were, as higher truths to Jews and Greeks in the old ages, "a stumbling-block" and "foolishness." They preferred to "hide their light under a bushel" rather than to place it in a candlestick, so that all might see the state of the agricultural house. And it is a pity that there are still some among us quite as purblind, although, happily, their numbers are gradually diminishing.

It is due to the memory of Mr Hall Maxwell, the late secretary of the Highland and Agricultural Society of Scotland, to say that he was the first who organized (or, at all events, persuaded) a staff of farmers to report upon the agricultural condition of Scotland. This fact is duly recognized by Mr A. W. Fon- blanque, of the Statistical Department of the

Board of Trade, in his Report, a digest of which appears below. We need not now enter into the merits of the *contretemps* between the late Mr Hall Maxwell and the Government, which, for a time, deprived our neighbours on the north side of the Tweed of the valuable information of which they had been the recipients for some years. All we may take occasion to remark is, that the Secretary of the Highland Society was too hasty, and the Government officials, to whom he was responsible, too finical.

For a long time English farmers, as a body—

"'Tis true, 'tis pity, and pity 'tis, 'tis true"—

held out against making any return. At first probably they felt annoyed at the notion of the constabulary being appointed to gather the desiderated information; and, as already remarked, not being quite sure that, under any arrangements as to collection, the figures would be to their advantage, many declined to afford any knowledge. Policemen are not now called upon to add the wandering about farm houses to their other multifarious duties. To each occupier of land, we are told by Mr Fonblanque, a blank form, stamped for free transmission by post, affords means "for the prompt collection of accurate information respecting the agriculture of the country." "And it would be difficult," it is added, "to devise a system attended with less trouble and inconvenience to the farmers." Most people will concur with Mr Fonblanque that the voluntary system, in the way of collecting agricultural statistics, is decidedly the best that has yet been conceived; but most people of experience will also be of opinion that there are few worse correspondents than farmers. Even with a "stamped" form, some of them fail to make a return, as appears from the following paragraph in the Blue-Book:—

"There are still, unfortunately, not a few occupiers of lands in parts of England who refuse to make returns, and this opposition increases the cost of, and protracts the collection of information. But perseverance in the system of voluntary returns, with estimates of the value of the information is refused, will

probably, in the end, and that in no great length of time, afford as satisfactory results as could be obtained under penalty by Act of Parliament." Is the end so near as Mr Fonblanque seems to believe? We hope so, alike in the interest of farmers themselves and the people for whom they are producers. The truth is ever rightful, and therefore there will be no harm, but much good, likely to accrue from its being plainly told in connexion with the acreage, crops, and stock of the country.

AGRICULTURAL STATISTICS—FROM BOARD OF TRADE RETURNS.

For the United Kingdom, the total number of acres returned as under all kinds of crops, bare fallow, and grass, was 46,100,153 in 1869, against 45,652,545 in 1868, shewing a difference in favour of 1869 of 447,608 acres. Of the total acreage returned in 1869, there were under corn crops (including beans and peas) 12,000,111 acres, of which 9,758,037 were in Great Britain, and 2,207,970 in Ireland; under green crops (including potatoes), there were 5,065,933 acres, of which 3,575,067 were in Great Britain, and 1,468,895 in Ireland; under bare fallow there were 761,369 acres, of which 738,836 were in Great Britain, and 20,981 for Ireland; and under grass there were of clover and other grasses from seed, 5,149,552 acres, of which 3,448,726 were in Great Britain, and 1,669,800 in Ireland; and of permanent pasture there were 22,811,284 acres, of which Great Britain had 12,735,897, and Ireland 10,046,877. The acreage under corn crops, as returned in 1869, was divided between the different kind of crops in the following manner:—In Great Britain, of the total number of 9,758,037 acres devoted to corn crops, 3,688,357 acres, or nearly 38 per cent., were under wheat; 2,251,480 acres, or 23 per cent., were under barley or bere; 2,782,720 acres, or 28 per cent., were under oats; 64,099 acres, or 0.6 per cent., were under rye; 575,204 acres, or nearly 6 per cent., were under beans; and 396,177 acres, or 4 per cent., were under peas. In Ireland the land under corn crops was very differently apportioned. Of a total of 2,207,970 acres, wheat was grown upon 218,117 acres, or to the extent of about 13 per cent.; barley upon 223,338 acres, or 10 per cent.; oats occupied as many as 1,684,788 acres, or 76 per cent.; and rye, beans, and peas together only amounted to 18,227 acres, or barely 1 per cent. of the land under corn. Although so large a difference is shewn between the proportionate acreage under corn crops in Great Britain and Ireland, the per-centage proportions for the principal crops will be found not to differ very much in Ireland and Scotland. As regards green crops, the following are the results for each kind of crop in 1869:—In Great Britain, of a total of 3,575,067 acres, 585,211, or 16 per cent., were returned as under potatoes; 2,171,526, or 60

t., as under Swedes and turnips; 292,742, or 8
it., as under mangolds; 14,344, or 0.4 per
as under carrots; 145,251, or 4 per cent., as
abbages, kohl-rabi, and rape; and 365,993, or
cent., as under vetches, lucerne, and any other
rop except clover or grass. In Ireland, of the
f 1,468,895 acres under green crops in 1869,
137, or 71 per cent., were under potatoes;
1,880, or 22 per cent., were under turnips and

n comparing the returns of 1869 with those of
the total acreage under corn crops in Great
shews an increase of 324,505 acres. As com-
with 1867, the increase in 1869 is as much as
7 acres. The cultivation of corn crops, as
by returns, has been extended in each of the
rs since 1867.

acreage under wheat in Great Britain shews an
e in 1869 over 1868 of 36,232 acres, but in
ere was an increase of 284,249 acres over 1867.
'shews an increase in 1869 against 1868 of
0 acres, which is only recovery of the decrease
3, as compared with 1867. Oats have not
much in acreage in the last three years, but in
ere is an increase over 1868 to the extent of

Beans had a larger acreage in 1869 than in
y 45,000, and it was in excess of the acreage
rop in 1867. Peas were grown upon 100,000
res in 1869 than in 1868; and although the
under peas was smaller in 1868 than in 1867,
eage in 1869 is much above that in 1867.

eland in 1869, as compared with 1868, there
mall decrease in the acreage under wheat, an
e of 35,000 acres in barley, and a decrease of
acres in oats.

green crops in Great Britain occupied a larger
reage in 1869 than in 1868 by 189,000 acres,
76,000 acres than in 1867. There is an in-
in the acreage under each kind of green crop.
, potatoes were more largely grown than in the
vious years—the increase of acreage in 1869
3,000 acres over 1868, and as much as 93,000
ver 1867; but the acreage under potatoes in
ritain still only a little more than one-half of
ent of the land devoted to the crop in Ireland.
urds turnips and Swedes, the average has varied
le in the last three years. In 1869, there is an
e over 1868 of 6000 acres, but the total is
what it was in 1867. The cultivation of man-
acred largely. In 1869, there was an in-
of 42,000 acres over 1868, and over 1867 the
, though still considerable, addition of 33,000

The acreage under carrots is small, and the
ions from year to year are not important. The
f cabbages, kohl-rabi, and rape are classed to-
and shew a larger acreage in 1869 than in
y 30,000 acres; but over 1867 the increase is
ore than 11,000 acres. The acreage under
, lucerne, and any other green crop, except
or grass, in 1869 is larger than in 1868 by

64,000 acres, but it is below the acreage in 1867 by
58,000 acres. Vetches or tares are the most largely
cultivated of this class of crops, and the acreage under
them was greater by 48,000 acres in 1869 than in
1868.

The acreage under potatoes and other green crops
in Ireland in 1869 differs but to a small extent from
what it was in 1868.

The other crops to be noticed are flax and hops.
In Great Britain, 20,923 acres were returned as under
flax in 1869, against 17,543 acres in 1868. This crop
is chiefly grown in England, the acreage under flax in
Wales and Scotland being but small. Flax is not
nearly so extensively cultivated in Great Britain as in
Ireland, where 229,000 acres were under that crop in
1869. The acreage under hops in England, to which
division of the kingdom the cultivation may be said to
be confined, is returned in 1869 at 61,785 acres,
against 64,455 acres in 1868; the decrease being at-
tributed to the prevalence of low prices for hops.
About two-thirds of the acreage under hops is in the
county of Kent. The other counties in which hops
are planted to any extent are Sussex, Hereford, Wor-
cester, Hants, and Surrey.

The quantity of land under bare fallow in Great
Britain, in 1869 is less by 22,000 acres than it was in
1868. The decrease is greatly owing to more correct
returns of the land which should properly come under
this denomination. In Devonshire, the decrease in the
acreage returned under bare fallow is exceptionally
large, and the increase in permanent pasture in that
county shews that the land has been more correctly
classified. But the increase in the acreage under corn
crops in 1869 also contribute to diminish the quantity
of fallow land. The quantity of arable land annually
allowed a season of rest is a point of much interest in
connexion with the drainage of land and the rotation
of crops as practised in different parts of the country.

The variation in the increase under grass remains to
be noticed. There is a large decrease in 1869, as com-
pared with 1868, in the number of acres in grass under
rotation, amounting to 511,000 acres for Great Britain;
and it is even higher in comparison with 1867. A
part of this difference is owing, as in the instance of
bare fallow, to more correct classification, which led
to the transfer to "permanent pasture" of land which
in previous returns was entered as "grass under rota-
tion;" but the failure of the clover plant in the dry
summer of 1868 caused a large diminution in the acre-
age of grass under rotation in 1869.

The acreage under permanent pasture in Great
Britain shews an increase in 1869 of 599,000 acres over
1868, and of 768,000 acres over 1867. This increase
is more than sufficient to make up for the decrease in
the acreage of grass under rotation. In some of the
grass districts permanent pasture has been more fully
returned in 1869, and it has also been increased by the
reclamation of mountain and other waste lands.

With respect to the returns of the number of live
stock in 1869, it may be observed that, as regards

Great Britain, the number of horses is for the first time included. Horses have always been returned in Ireland, and were also included in the agricultural returns formerly collected in Scotland; but they have been omitted from the returns collected in Great Britain until 1869, when it was considered that the interest so generally taken in the available supply of horses, and their importance as farmers' stock, rendered it inadvisable any longer to exclude them. At present the number of horses in Great Britain has only been ascertained so far as they are in the possession of occupiers of land. The total number so returned upon the 25th June 1869 was 1,461,000. It is estimated that there may have been at the same date an additional number of 500,000 horses in the metropolis and other towns. The total number of horses in Great Britain would thus amount to about 2,000,000. The number of horses returned for the town and country districts in Ireland in 1869 was 527,000.

As regards the live stock used for food, there was a decrease in the number returned in Great Britain in 1869. The number of cattle and sheep was reduced, owing to the failure, in 1868, of turnips, and other descriptions of autumn and winter food. The number of pigs was greatly lessened, chiefly in consequence of the continued dearth of corn; but in some parts of the country there were losses from diseases in the winter of 1868. Cattle shew a reduction in Great Britain of 110,000 in 1869 as compared with 1868, but the number in 1869 is 320,000 above the number of 1867. In Ireland, the number of cattle increased in 1869 over 1868, in which year there was a decrease from 1867.

The number of sheep in Great Britain is less by 1,173,000 in 1869 than in 1868, but the number in 1869 is larger by 619,000 than it was in 1867. In Ireland, there were 174,000 fewer sheep in 1869 than in 1868. The difference in the relative number of sheep and cattle in Great Britain and Ireland is very great. To every head of cattle there are in Great Britain about $5\frac{1}{2}$ sheep, and in Ireland $1\frac{1}{4}$ sheep. Cattle are, however, kept in larger numbers in Ireland, in proportion to the acreage, than in Great Britain.

The decrease in the number of pigs in Great Britain is 378,000 in 1869 as compared with 1868. There was a much larger falling off in 1868 as compared with 1867. The difference between 1869 and 1867 is rather more than one million, which is equivalent to a diminution of 35 per cent. in the number of pigs in Great Britain in two years. The number of pigs kept in towns and by cottagers having less than one quarter of an acre of land are not included in the returns for Great Britain. There is an increase of 1,000 pigs in Ireland in 1869 as compared with 1868, but that is not equal to the decrease in 1868 as compared with 1867. Pigs are generally supposed to be numerous in Ireland, but the average number on 1,000,000 acres of occupied land differs but little in Ireland from what it is in Great Britain.

Of the total acreage returned for all England, $52\frac{1}{2}$

per cent. is in the grazing or western division, and $47\frac{1}{2}$ per cent. in the corn or eastern division; but the differences in the agricultural conditions of the two divisions are very marked. Thus, of the total acreage in the grazing division, 25 per cent. is under corn crops, against 43 per cent. in the corn division. Green crops occupy 9 per cent. of the total acreage in the grazing and 14 per cent. in the corn division. The land returned as under bare fallow in England is nearly equally divided between the two divisions; but the proportion of fallow to the total acreage, less the permanent pasture, or to the acreage of arable land in each division, is 5.5 per cent. in the grazing, against 4.3 in the corn division. This difference leads to the inference that moor or waste land is wrongly returned as fallow. In some of the grazing counties the proportion of the acreage under clover and grass under rotation is nearly the same in each division, viz., 9 and 8 per cent. respectively. Permanent pasture occupies 54 per cent. of the acreage in the grazing, and 31 per cent. in the corn division. Of the land under wheat in England there is but 39 per cent. in the grazing, against 61 per cent. in the corn division. The proportion under barley varies a little more, being 38 per cent. in the grazing, and 62 per cent. in the corn division. Under oats there is more land in the grazing than in the corn division, the proportions being 52 and 48 per cent. respectively. The proportions of the land under both beans and peas are largely in favour of the corn division, viz., for the two crops, 72 and 75 per cent., against 28 and 25 per cent. in the grazing division.

For the British possessions there is but little information, except for the Australian colonies and the Cape of Good Hope.

In the colonies upon the Continent of Australia, according to the latest returns, there were under corn crops 1,310,000 acres, of which 991,000 acres were under wheat. South Australia and Victoria, according to the returns, are the chief wheat-growing colonies, the acreage under that crop being 550,000 acres in the former, and 258,000 acres in the latter colony. The yield of wheat is liable to very great variations in Australia. The crop in South Australia in 1868 is reported to have been diminished to the third of the ordinary production, by the prevalence of the "red rust" blight. The highest average produce per acre of corn and potatoes is in New Zealand.

The number of cattle returned in 1868 is 3,515,000 for Australia, and about 400,000 for New Zealand and Tasmania. The number of sheep returned is, 37,441,000 for Australia, 8,418,000 for New Zealand, and 1,742,000 for Tasmania—making a total of 47,600,000 as the stock of sheep in the Australian colonies. This total, as compared with the number given in the colonial returns 1867, shews the large increase of 4,000,000 sheep in one year. The latest return for the Cape of Good Hope in 1865 shews, that there were as many as 692,000 cattle and 9,836,000 sheep.

Comparing the stock of sheep at the dates in these

returns, and the quantities of wool exported from the colonies in 1867, there is a very near agreement between Australia and the Cape of Good Hope in the average weight of wool exported per head of the stock of sheep. The average is 3.75 lb. for Australia, and 3.65 lb. for the Cape of Good Hope.

M. Legoyt, Chief of the Department for the General Statistics of France, has attached to the returns an interesting report upon the agriculture of France at different periods, and also an elaborate introduction explanatory of the information collected in 1862. There has been a marked change in the description of bread-corn grown in France. In 1862, as compared with 1840, the cultivation of wheat shews an increase of 33 per cent., and that of rye and mixed rye and wheat a decrease of 25 and 45 per cent. respectively. In the same period the average yield of wheat increased from 13.9 to 16.3 bushels per English acre, and potatoes were more largely grown by 34 per cent. It appears that in the fifty years from 1815 to 1865, France imported more corn and flour of all kinds than she exported. The cultivation of sugar-beet-root in France increased from 57,000 hectares in 1840 to 136,000 in 1862, or 137 per cent. The quantity of land annually left fallow has decreased; in 1862 it amounted to 20 per cent. of the land under tillage.

The number of cattle (omitting calves under one year) was larger in 1862 than in 1842 by 1,000,000, the increase being almost entirely in cows. The number of sheep in the same period decreased. It is stated by M. Legoyt that in countries in which small holdings prevail, the number of cows generally increases and the number of sheep diminishes.

The large product of corn in the United States is stated by Mr Ruggles to be greatly facilitated by the numerous machines used for sowing, reaping, threshing, and preparing the grain for market. The number of reaping-machines employed in the United States in 1866 was estimated by Mr Gould, formerly President of the Agricultural Society of the State of New York, at 210,000; and the number now in use is believed to be much larger. The product of cereals in the United States in 1869 is stated to have been 1,450,000,000 of bushels (Winchester measure), of which 906,000,000 bushels, or 62 per cent., were maize; 255,000,000, or 18 per cent., were oats; 224,000,000, or 15 per cent., were wheat; and 65,000,000, or 5 per cent., were barley, rye, and buckwheat. The consumption for human food, estimated at 8 bushels per head of the population, is 312,000,000 bushels, and from 500,000,000 to 600,000,000 bushels are supposed to be consumed by animals.

MR MECCHI AND FARM CAPITAL.

MR MECCHI is certainly an indefatigable farmer. His pen is never at rest at least, whatever his plough be. No matter what point in agriculture comes upon the *tapis*, there is Mr Mechi not only willing but eager to give advice, even with or without being asked for it. And this instruction, so far as we have observed, is always based upon his own experience. Now, there is nothing more trustworthy than experience—it is even equal (as the old proverb assures us) to the task of teaching fools; but is Tiptree Hall Farm, with its 170 acres, so variable in the character of its soil, so divergent in temperature and rainfall, one field from another, as to form a perfect gauge of the whole of the agricultural portions of the British Isles? If so, then Mr Mechi's experience, which he says is a profitable one, ought to guide the practice of others every-

where; but if, on the other hand, that little plot down in Essex does not in itself exhibit all the varied conditions of land and climate to be found throughout the country, then, obviously, Mr Mechi's experience must be limited, and not, as he would have it, universal in its application to agriculture. It must just go for what it is worth within its own circumscribed area, and cannot be accepted as the basis of good farming in all parts of the country. No one will for a moment deny that Mr Mechi's writings, by stimulating discussion, and inciting to improvement, have done a great deal of good. Still there are not a few thoroughly practical farmers who are of opinion that at least some of Mr Mechi's swans, in the way of agricultural facts, are really little bigger than geese. They are doubtful whether he does not occasionally draw a *rather* long bow, both

as to the results of his own practice, and in his statements as to the benefits that would accrue to agriculturists in general, were his recommendations acted upon. For instance, in the discussion after his paper upon "Farm Capital," which appeared in last month's *Magazine*, he was pretty well taken to task by all those engaged in the debate, who could not be charmed into seeing—although Mr Mechi "charmed never so wisely"—that £20 an acre of tenant's capital laid out upon land would ever pay the tenant. Mr Ling, Bedford, put this in rather a strong way. He said, he had for a long time thought—

Their friend Mechi was simply a beacon for farmers to beware of, and that opinion was confirmed that night. Mr Mechi talked to them about putting a lot of capital into the land, but he had seen his own figures to the effect that he gave £25 an acre for the Tiptree Hall farm, and then laid out nearly £50 an acre as landlord's permanent improvements, and then it was to have £20 an acre as tenant's capital, which amounted to £12,000 on the 160 acres. His profits were £600 a-year at the extreme, which was 5 per cent. for his money, including landlord's and tenant's capital, and a man must be a very bad judge of laying out his capital if he could not make it pay more than 5 per cent. The landlord would claim 2½, 3—some might want 4 per cent. for their outlay; and if that was paid to the landlord how was the tenant to live? Mr Mechi was a self-appointed teacher of farmers—and he had got a lot of very inapt pupils. He always looked on Mr Mechi as an amateur farmer, which was the same as an amateur runner or sculler—he did not do it for gain. There was no difficulty in making a lot of fat bullocks; it could be done with money, but the question was, how about the pay? It was all very well to talk about growing food for the people, but what he said was, let us grow food for ourselves first.

Mr Biddell, on the other hand, tried to let down Mr Mechi easily, although it was evident that he held precisely the same opinions regarding the soundness or unsoundness of Mr Mechi's views as did Mr Mechi. He did not, he said, "term him a self-appointed instructor. He thought him a willing adviser; but they were at liberty to reject his advice." Again, he remarked that he did not think that he would lay out more than £20 an acre of tenant's capital as Mr Mechi recommended, and, with a thoroughly practical turn, he stated that he had understood Mr Mechi to say that "the employment of capital

would answer better on poor land than good land," asked Mr Mechi if it would pay better to put £15 or £20 per acre into a tract of poor land lying between Wilford Bridge and Oxford Quay, which was worth 7s. per acre, or into land within "a circuit of a mile and a-half of Framlingham Castle, the rent of which would be 37s. an acre." His own notion was, that if such a large capital were laid out as was recommended by Mr Mechi, it would be decidedly preferable to apply it upon the good and not upon the bad subject.

Mr Goodwyn took up Mr Mechi on his suggestions as to breaking up pasture lands, in which he could not concur, especially at the present time, when stock was paying better than cereals. On the contrary, he thought it questionable whether even the pasture lands should be reduced in the same ratio as was at present being done in many places, "for it was by means of the pastures that stock was kept." This gentleman also doubted the benefit, in all cases, of Mr Mechi's wished-for very deep ploughing; and not a few, who have seen the effects of subsoiling on some lands and for some crops, will agree with him that to go too deep is as prejudicial as it always is to cut too shallow, or, to use a phrase of Mr Mechi's, merely "scratch" the ground.

Mr Corrance, M.P., also shewed the fallacy of Mr Mechi's statistics; doubted the policy of breaking up pastures, seeing that farms with a fair amount of grass lands were most sought after, a fact which we can ourselves corroborate. Altogether, the worthy ex-alderman appears to have got himself into a "nest of hornets" at Framlingham, and his retreat can hardly be said to have been more graceful or satisfactory than those smarting from the stings of the literal insects.

On a question being asked by the President of the Society, Mr Corrance, as to where this capital which Mr Mechi desiderated was to come from, the latter remarked, with the greatest *nonchalance*, he "would say to both landlord and tenant, if they take 200 acres instead of 400, they would double the capital per acre directly." What a wonderful dis-

covery! And then what is to become of the other 200 acres? Are they to be left to grow nothing but weeds and thistles, the seeds of which, wafted every season by the wind upon the highly capitalized, and what of course, therefore, should be highly cultivated lands, would soon spring up there, even with the outlay of more capital than that which Mr Mechi proposes as enough? "Ill weeds grow apace," and Mr Mechi apparently desires to give them a chance, so as to be able to state from "his own experience" whether the old adage be truth, or the reverse. We had always thought that

what was most wanted in connexion with the agriculture of this country, at the present time, was capital to reclaim lands lying wholly waste, but which could be made to pay; not to throw lands out of cultivation those who now farming them consider tolerably profitable—or with the returns of which they are at least content—in order to sink the money they are now managed with in small fancy places, the profits yielded by which are doubtful, and even, according to the most glowing accounts, not at all el Doradian. No, no, Mr Mechi; this last notion will hardly do—the agricultural public.

TOWN SEWAGE—WHAT IS IT?

WE concluded our first article under this head by giving the composition, in a general way, of town sewage. The matters which make up this composition vary in quantity and in kind; but the principal and most valuable constituents are obviously derivable from the excreta of our population. To obtain a fairly accurate view of what sewage is, we must glance, however briefly, at the constituents of human excreta in their two forms of liquid and solid. And first, as to the liquid portion, or urine. The major portion of this is made up, as might be supposed, of water, there being 933 parts in 1000 of urine, so that all the valuable materials—valuable in an agricultural point of view—are contained in the small proportion only of 67 parts in 1000. These fertilizing constituents are nitrogen, phosphoric acid, potash, and organic matter; and of these as follows:—Nitrogen, 14.24; phosphoric acid, 2.37; potash, 2.00; organic matter, 41.36; the remainder of the 67 parts being made up of other substances, as sulphate of soda, common salt, &c. The nitrogen is obtained in largest quantity, 13.16 grains, from the urea, of which there are 30.10 grains in 1000 of urine; 0.40 grains being obtained from the chloride of ammonia, 1.5 grains in 1000; 0.35 grains

from the phosphate of ammonia, 1.65 grains in 1000; and 0.33 grains from the uric acid, 1 grain in 1000. The phosphoric acid, 0.89 grains is obtained from 1.65 grains (in 1000 of urine), and 1.48 from the phosphate of soda, 23 grains of which are in 1000 of urine. The potash, 2 grains, being obtained from the sulphate of potash, of which there are 3.71 grains in 1000 of urine. The organic matter in urine consists of 23 grains of urea, minus the nitrogen, 17.14 grains of lactic acid, 1 grain of uric acid, and 0.32 of mucus. There are thus of valuable agricultural constituents in 1000 grains of urine, 60.67 grains, of which nitrogen is equal to 14.24 parts, corresponding to 1.729 grains of ammonia, and 2.37 of phosphoric acid, in the form of soluble phosphates, corresponding to 5.17 grains of phosphate of lime. Let us now turn to the composition of the solid excreta. In 1000 parts there are no fewer than 733 parts of water, 70 of debris of food, 40 of organic matter soluble, and 140 insoluble in water, and 12 of mineral saline substances. Of these the following are the constituents:—Carbonate of soda, 294; chloride of sodium, 235; sulphate of soda, 118; phosphate of ammonia and magnesia, 235, and 118 of silica, with traces of sul-

phate of chalk. In 100 grains of dried solid excreta there are 5.6 of nitrogen, 4.27 of phosphoric acid, 1.19 of potash, and 82.98 of non-nitrogenous organic matter.

Let us briefly state now the money value of urine and solid excreta in its moist or natural state. In 100 tons of urine there are 1.729 tons of ammonia, the value of which may be set down at £96, 16s.; 0.51 ton of soluble phosphate of lime, having a value of £16, 6s. 5d.; 0.20 ton potash, equal in value to £6, 4s.; 4.14 of organic matter, at £4, 2s. 10d.; or in all, £123, 9s. 8d. per 100 tons, or 24s. 8d. per ton; and this ton is stated to be produced from 1000 individuals per day, allow-

ing 40 ounces per head. In 100 tons of solid excreta, in their moist or natural state, there are 1.70 tons of ammonia, equal in value to £95, 4s.; 2.30 of insoluble phosphate of lime, equal in value to £16, 2s.; 0.29 of potash, equal in value to £8, 19s. 10d.; and 21 tons of organic matter, equal in value to £21; making the value of 100 tons equal to £141, 5s. 10d., or 28s. 3d. per ton. 1000 people producing on an average 6 ounces per diem, equal to .1674 ton. But this estimate of 6 ounces per day, per head, is taken exception to by high authorities, and 2 and 2½ ounces per day is given by them as the accurate statement.

Farm Implements and Machines.

NOTES ON NOVELTIES AT THE SMITHFIELD SHOW.

TRACTION ENGINE ON SPRINGS.

ONE of the novelties at the late Smithfield Club Show was a very neat 8-horse traction engine on springs, designed and patented by Mr Greig, of the firm of John Fowler & Co., and constructed and exhibited by that firm. The great difficulty of applying springs to traction engines, which has lately much engaged the attention of makers, is, we think, most ingeniously overcome by this arrangement of Mr Greig's. During the time of the show, this engine was to be seen careering about over the rough causeways at the Midland Goods Station, and from the very efficient way in which the springs appear to act, there cannot be a doubt as to the great utility in their application to traction engines, in saving the working parts from the constant jarring and knocking caused in passing over rough and uneven surfaces. We think the exhibitors would do well to consider whether this principle could not be introduced into their steam-ploughing engines, so as to adapt them for the general carriages of the farm. It is quite clear, that until some such facility is afforded for lessening the horses required for that purpose, cultivation by steam cannot, in this country, become general. From the inquiries made about this engine, and the number of orders taken by the firm, on this its first appearance, we argue that it is a step in the direction of progress.

The *Engineer* of 10th December, gives woodcut illustrations of this engine, and thus describes it:—

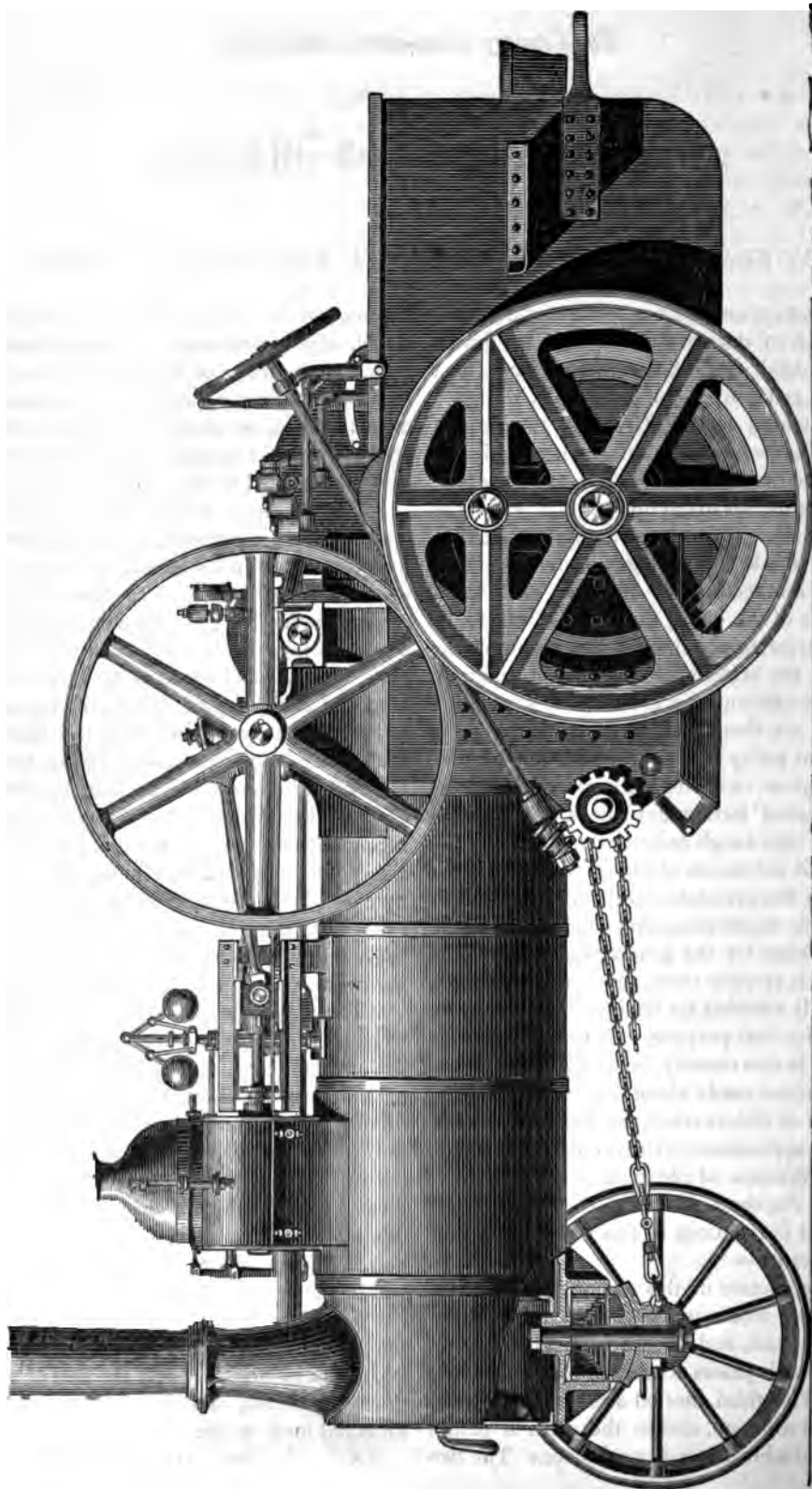
"The motion in this engine is transmitted by gearing from the crank-shaft to an intermediate shaft, and thence to a third motion shaft, which passes across the back of the fire-box. The third motion shaft carries at the one end a pinion, and at the other a pinion and spur-wheel, cast in one piece. The two

pinions just mentioned gear each into a spur-wheel, which revolves upon a casting securely bolted to the frame of the engine, these castings each forming a hollow fixed gudgeon, 14 inches in diameter outside. The spur-wheels are kept in place on the gudgeons by wrought-iron plates, fixed to the end of the latter.

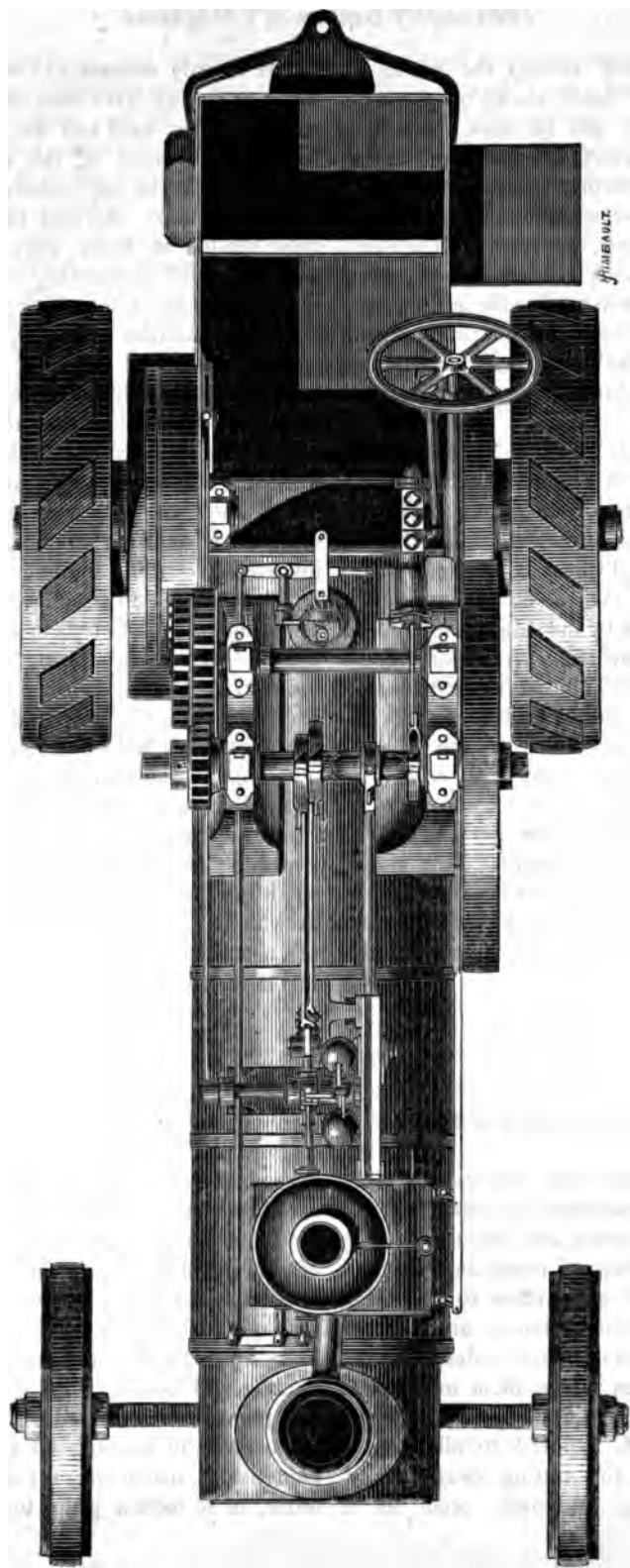
"The hind axle, which passes through the gudgeons just mentioned, is made square for the greater part of its length, the ends, however, being of course of circular section to receive the hind wheels, which revolve freely on it. Above this axle is placed the ordinary plate spring, which receives the weight of the hind end of the engine, this spring being connected by its strap—which passes down on each side of the axle—with a strong knuckle or bracket bolted to the back of the fire-box casing. In addition to this plate-spring, which receives the downward pressure, there are also interposed, between the under side of the axle and brackets fixed to the frame, india-rubber rings, which act as check springs and prevent any jumping when the engine is passing over exceptionally rough roads.

"The motion is transmitted to the driving-wheels, from the spur-wheels revolving on the hollow gudgeons, simply by means of pins, each of which, passing through a boss on its driving wheels, enters a long hole or slot formed in the corresponding spur-wheel, as shewn in the section. This arrangement gives every facility for disconnecting either driving-wheel,* by simply drawing out the corresponding pin, and, at the same time, it leaves the wheels and axle perfectly free to rise and fall, and accommodate the action of the spring. The latter, moreover, we should add, from its position, acts the part of a compensating beam, and at all times maintains an equal load on the two driving wheels.

"At the leading end, the engine is carried



Mr Greig's Traction Engine on Springs - Side Elevation.



Mr Greig's Traction Engine on Springs—Front Elevation.

upon a steel spiral spring, the mode of arranging which is clearly shewn on the side elevation, where it will be seen there is a casing somewhat resembling a buffer casing bolted to the bottom of the smoke-box. This casing encloses the spiral spring, and it is fitted with a plunger, the head or lower end of which is spherical, and fits into a casing of corresponding form fixed to the leading axle. This arrangement allows the front pair of wheels to adjust themselves freely to the inequalities of the road, without interfering with the action of the spring.

"The engine has a single steam-jacketed cylinder, 9 inches in diameter, with 12-inch stroke, and the motion generally is of Messrs Fowler's usual pattern. The steering is effected by a hand-wheel, conveniently situated at the upper end of an inclined shaft, which passes down by the side of the fire-box casing, and is provided with a worm at its lower extremity. This worm gears into a worm-wheel fixed on the end of a shaft extending across the front of the firebox casing, and on this shaft are coiled, in opposite directions, two chains, which are respectively led off towards the opposite ends of the leading axle, as shewn. This simple arrangement of steering gear is very effective, and the engine can be readily steered with one hand even when going at full speed over a rough road.

"It is only necessary to watch the action of the engine we have been describing, when travelling over hard and uneven ground, to become convinced of the vast benefit derivable from the application of springs to traction-engines. Springs thus applied do good service in many ways. They relieve all parts, and particularly the boiler, from the severe jolts and racking strains to which they are otherwise exposed; they ease the 'jump' which an ordinary traction-engine is apt to make when starting with a heavy load; and they add materially to the comfort of the men by whom the machines are worked. The only objection which, so far as we know, has ever been raised to the use of springs on such engines, was that they involved a certain amount of complexity; but this objection cannot, we think, be fairly urged against Mr Grieg's system of applying them. Mr Greig's plans, in fact—as our illustration shews—involve no complexity whatever, and we may add that they give thoroughly satisfactory results in practice.

"Taken altogether, the traction-engine we have described is an excellent example of neat and simple design, and first-class workmanship; and we may mention, in conclusion, as an instance of the resources of the works at which it was constructed, that, although of a new pattern, this engine was built in rather less than five weeks."

THE IMPLEMENT SHED AND ITS WORK.

TO those who know the value of the various implements and machines used in farming operations, and what cost they are, it is a matter of much surprise how little attention is paid to the manner in which they are stored. How often do we see them lying in the open air, exposed to all sorts of weather, rusting and rotting away rapidly. In some cases, they are stored in the open field, by the road-side, or in the stack-yard, exposed to all sorts of weather, rusting and rotting away rapidly. In some cases, they are stored in the open field, by the road-side, or in the stack-yard, exposed to all sorts of weather, rusting and rotting away rapidly.

they cost but little, in place of costing, as they do, a great deal. But even on the supposition that they are but of little value, the practice we have referred to does not come within the rule of that prudence which looks to the pence, knowing that, if these are looked to, the pounds will take care of themselves. The first point to be attended to in this important department of keeping all the tools, implements, and machines of the farm in good order, is to have a place to keep them in.

place for everything, and everything in place." Hence the importance of an implement shed forming part of every farm ing. In this a closed-in part should be shed, and in it all the minor tools should be placed in order, and there kept under lock and key. For, like the lodging-house cat, it can draw corks, eat sugar, and drink tools, when left to themselves, have a knack of locomotion, walking away to other diggings." Then, in the open part of shed all the larger implements should be placed in regular order; and before being so placed should be overhauled to see that there are no defective parts; and to clean and oil the moveable parts, and to cover bright iron with white lead and tallow. A place so ordered, and so kept in order, will unquestionably result in a large saving of time, and prudent men know that time is money. I have frequently been surprised to note how much time is lost, in the very midst of working operations, in hunting up the various tools and implements required to carry them

We have no hesitation in saying that the estimate was made of the value of the time lost in this way in the course of the season on many a farm, the result would be far surprising, but by no means satisfactory. Then, again, to be added to this waste of loss is another source which would suppose would be at once obvious, which is apparently not so, if we consider largely and frequently it is overlooked namely, the time lost in waiting for implements, machines, and tools *to be repaired*; now, we mean, during the very time in which the operations on which they are engaged are being gone on with. Now, it is obvious, that if at the time when the machines, tools, &c. were done with for the season, they were put away in good working condition, that the following season following they would be ready for their work. This of course involves the necessity, at the time of their

being placed in the implement shed, of being overhauled, and if any parts are defective then, that these parts should then and there be made good. If they are required to be sent to the blacksmith's, or to the carpenter's, they should be sent at once, and as they will not be required to be repaired in a hurry—as they would if sent when in the midst of the season's work—the result will be that they will be more cheaply, and certainly more effectually repaired: hurried work is always costly work. When the machines, &c., are thus put away in good repair, ready for the work of the succeeding season, they will, as said above, be ready for the season's work; yet, in the course of the week or so preceding the period when they are to be used, an hour or two should be devoted to cleaning all the work, freeing movable parts from the accumulated dust and clogged oil, and fresh oiling them.

As a useful adjunct to the implement shed, we would strongly recommend having a small workshop, fitted up with joiner's bench, a vice or two, and a small portable forge. There is many a "handy" fellow about a farm who has a mechanical knack about him, which, with such aids as above indicated, could be turned to good account. Many small jobs could thus be done at a large saving of time and money—time especially; for it is clear, that if the smallest repair cannot be done on the premises, the implement or machine has to be taken to the blacksmith, or the carpenter, equally with those which require important repairs. Moreover, if a "handy" fellow, such as above alluded to, be not resident on the farm, there is many a clever mechanic on the move from place to place in search of work, who would gladly pitch his tent for a day or two, and turn out a valuable amount of work in the way of repairs.

We give these crude hints for what they are worth; if acted upon generally, they will be found to be worth a good deal.

THE DOUBLE-FURROW PLOUGH.

IN continuation of our remarks, at p. 102, on the merits of this implement, it may be stated that although double-furrow ploughs have been made and tried from the days of Lord Somerville downward, agriculturists generally have not been impressed with their value until the more recent trials of improved implements have vindicated their importance as suitable and economical implements for working the land. One requires only to turn to "Loudon's Encyclopædia of Agriculture," p. 395, to find an engraving of "Somerville's double-furrow plough," thus described by Loudon himself:—

It is obviously advantageous in performing more labour in a given time, with a certain strength of team, than other sorts of ploughs, as producing two furrows at a time. It has been found useful in the lighter sorts of lands when the ridges are straight and wide, though some think it more confined in its work than those of the single kind. The saving of the labour of one person, and doing nearly double the work with but little more strength in the team, in the same time, recommend it for those districts where four-horse teams are in use. This plough has been brought to its present degree of perfection by Lord Somerville, especially by the introduction of the moveable plates already mentioned,* at the extremities of the mould board, as in his lordship's single plough. But, as observed by our excellent authority, "with all the improvements made by Lord Somerville, it can never come into competition for general purposes with the present single-furrow ploughs." Lord S. admits that it would be no object to invade the system already established in well cultivated counties, though where large teams are employed, with a driver besides the ploughman, it would certainly be a matter of importance to use the plough at least on light friable soils. "The horses will not feel the difference between the single-furrow working here, and the double-furrow working there, where two acres are ploughed in the same time as one here, and look

manifest saving in draught, proportionately speaking, in comparison with first-rate made single-furrows, the decided gain upon time in turning at the headlands, and the practicability of doing, at least, an equal amount of work with three horses and one man, where four horses and two men were required before, there cannot be two opinions regarding the future of this ingenious implement. Whatever other arrangements may be necessary to make, with the usual staff employed upon the farm under the ordinary code of tillage operations, we have nothing to do. We see a patent fact before us realized, and realizable where proper implements are employed, which contributes to the economy of farm operations, and forms a decided gain in the history of agricultural progress.

But double-furrow ploughs, in general, have been dragging out a sort of weary existence during the first half of this century. The distinguished plough makers, Ransomes of Ipswich, and Howards of Bedford, have offered very good implements of the kind for upwards of a quarter of a century, but agriculturists have not quite appreciated their value, and were slow in patronising them at all; consequently, their increase throughout the country has not called for any special remark. The fine single wheel ploughs of these makers, which, for regulation and steadiness, have gained no end of laurels, have been found to render such admirable service, that it must be a well-favoured, efficient, and economical rival that has any chance of recognition on the part of the farmers of the country. Moreover, it always takes an effort for the many to move out of the beaten track of successful practice; and hence the difficulty of getting even a good article expeditiously introduced.

But a time of reaction comes, and the first notes that awaken public attention are sounded in the far north—at the Aberdeen Show of the Highland and Agricultural So-

* The moveable plates are of iron, and are fixed to the mould board by means of screws. They are so arranged that they can be moved forward or backward, according to the nature of the soil, and the width of the furrow required.

† In the year 1841, Lord Somerville improved upon the double-furrow plough.

ciety in 1868. There a new candidate for public favour appeared in the shape of "Pirie's Patent Double-Furrow Plough."

This implement differs from Howard's and Ransome's in having three wheels so placed as to regulate the action of the plough, in respect of depth and regularity of furrow; to reduce friction to a minimum by dispensing with the ordinary side and sole plates, and to render the common stilts an unnecessary appendage, from the nice way in which the wheels are balanced and adjusted. Besides this, the whole action of the plough is controlled with levers, and the man in charge has only to work at the helm when cases of adjustment and alteration are necessary, following the implement chiefly to take charge of the team of horses, as is done at the grubber or the harrow. Pirie's double-furrow plough implement, priced in his catalogue at £15, 10s. (the same article is sold cheaper now), is thus described by himself:—

This plough has a strong angular frame, cast-steel skifes, mould-boards, and shares, fitted with right and left hand lifting levers, each having a screw for adjusting the depth of either furrow without stopping the horses. The steering lever is fitted with circular rack and pinion to give it increased action, and the after wheel is attached to the skife by a wrought-iron bracket and adjustable stud-pin.

This plough created considerable sensation, and not only did farmers invest in it as a likely article for cheapening labour, but our great steam-plough manufacturer, Fowler, of Leeds, and others, entered into an arrangement with Pirie for his patent; and the buzz of commercial activity in that way from that time began in earnest.

Fowler & Co., with the patent secured, began to improve upon its details, and succeeded so far to beat the original patentee in a lengthened and very satisfactory trial that took place at Holmston, in Ayrshire, on the 1st of May 1869. The following is an extract from the judges' official report to the Ayrshire Agricultural Association:—

We are all well pleased with the work of the double-furrow ploughs as a whole, and believe that they will prove efficient and economical implements as regards the cultivation of fallow land, the only kind on which we have seen them tried. The uniformity of depth at which they work is a recommendation in the pre-

paration of land for green crops. The main feature of the ploughs is the same, and the choice must depend in a great measure upon material, workmanship, price, and comparatively small differences in details of construction. Taking these elements into account, and judging by the performance to-day, we place Pirie's plough, shewn by Jack & Sons, first; that shewn by P. & R. Fleming & Co., second; and that by Messrs R. Mitchell & Son, third—all Pirie's patent. . . . The breaks made by the ploughs were particularly admired, and were superior to any ever seen made by a single-furrow plough. The soil is thoroughly stirred without being raised too high at the forming of the fore-furrows, as is frequently done by single-furrow ploughs. The great advantage to be derived from the double-furrow plough is, that two horses will be able to draw it comfortably enough, and in ordinary soil to double the extent of work, or the same amount of work as could be done by four horses with two single ploughs. Farmers will thus save the time and work of a man and two horses. A practical advantage arising from their construction is, that the depth of the furrow is not left to the chance guidance of the ploughman, but is carefully regulated. Thus, the land is more equally stirred and pulverized. In preparing the ground for green crops, the advantage of the double-furrow will be greater even than in ploughing for white crops. It seemed to be the almost universal opinion of the practical agriculturists present, that Fowler's plough, noticed above, exhibited by Messrs Jack & Son, was the best. The furrows made by it were much sweeter cut, and more neatly formed, than those coming from any of the other implements. It is also the most simple in construction, the lightest in draught, and the smallest in cost [priced at £11], which are all great recommendations in its favour.

It is chiefly in details that Fowler's plough differs from the original patent; and then there is this to be considered, that the adjustment of all its parts to co-operate upon the land experimented upon, together with the judgment of the ploughman at the helm, has something to do in turning a finely-shaped furrow, with the shoulder high-crested, and all well impacted together, to present a proper seed bed, so that all seeds deposited shall not be deprived of the power of germination by falling, and being buried, in vacuum, caused by incomplete workmanship. In that respect, the judges appointed by the Ayrshire Association seemed to think Fowler's, in some degree, superior. Annexed is Fowler & Co.'s description of the improved implement (fig. 1).

The front and back wheels shewn in the engraving run at an angle in the bottom of the furrow, and are so arranged that they take the whole of the thrust

M

caused by turning over the furrow-slice, thus dispensing with the land side and slade, and substituting a rolling for a sliding friction. The left side of the plough is carried by a wheel fixed to the lever, shewn in the engraving. This wheel runs on the unploughed land, and may be arranged as a castor, thus giving great facility in turning the plough at the headland. This lever also serves the purpose of disengaging the

shewn in the engraving is fixed to the axle of the front wheel in such a manner that the plough may be steered and turned with the greatest ease.

With all the mechanical efficiency for which Fowler's plough is undoubtedly remarkable, it has had a formidable rival to contend with in the implement of John Gray & Co., of

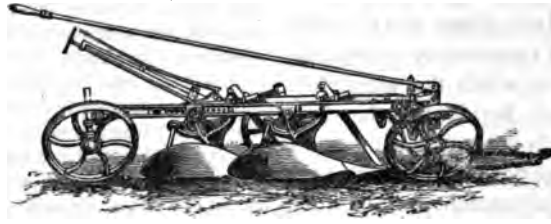


Fig. 1.—Pirie's Double-Furrow Plough—Improved by Fowler.

plough from its work at the end of the field, as if by lifting it up till the catch shewn in it comes into play, the shares are so raised that they draw themselves out of work, and clear the plough from the furrow. The depth of the work is regulated by the T handle, shewn on this lever. On the other end of the rod connected with this handle is a screw, by which the man can adjust the depth without shifting the plough. On this plough (unlike all other double-furrow ones) the width of the furrow may be adjusted from 7 to 10 inches. This is done for the first furrow by shifting the front wheel on the bar to which it is attached,

Uddingston. In the more recent trials that have taken place, we find, on investigation, that of Gray's taking undoubted priority. These well-known Scotch plough makers seem not only to understand the tastes and wants of their own farmers in the matter of both stubble and lea ploughing, but we hear of their implements taking precedence in Ireland, at Kenreight, and at Tirkeeran — where they had first, second, and third awards,

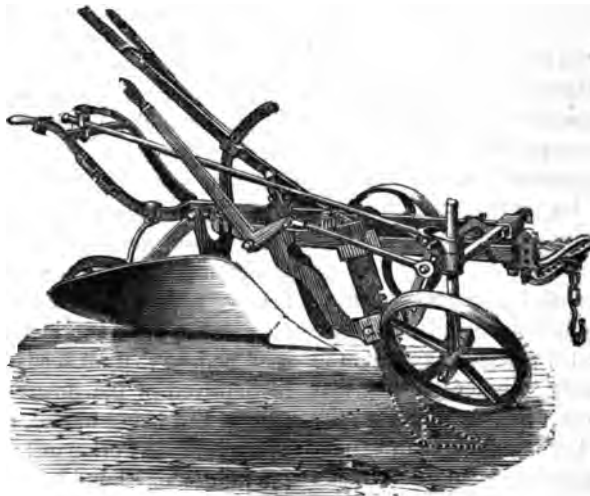


Fig. 2.—Single-Furrow Plough and Subsoiler.

... of which are all shifted on the same part of the frame. This is the only double-furrow plough now made that is completely fitted with adjustable furrows, the great advantage of which is known by all practical farmers. The long handle

... following. At Woolmer, in Northumberland, they triumph over other makers, taking first position; and under the auspices of the Writhington and Standish Society, near Wigan, the same success attends

plough in the hands of a farmer competent while their great success under the eyes of the United East Lothian must be in the recollection of our readers. is of considerable importance, it takes lying position both in stubble and lea

upon it in general construction as to lightness of draught, and having beautiful mould-boards which twine, or twill, or twist in both lea and stubble furrows like a rope, without breaking the land, at the same time impacting it with admirable regularity, and leaving a seed-bed

Fig. 3.—Gray's Champion Double-Furrow Plough.



hing, and seems to work very well in soils, when many others all but fail. pearance, John Gray & Co.'s "Champion Double-Furrow Plough" much resembles Pirie's, but seems to be an advance

and a general finish, which almost leaves nothing to be desired. Their G.B. plough, furnished with morticed coulter holes, is priced at £13, 12s., and seems, upon the whole, to be the best implement they offer.

els as an innovation only fit to be d by inexperienced ploughmen who ld not hold their ploughs in a workman- : manner, so as to regulate the depth and ure neatness as to equality of surface. e mechanical skill brought to bear upon manufacture of agricultural implements utterly demolished that theory, and er more effectively than under the severe : which double-furrow ploughs have under- ie for the last twelve months. Very much been made of, and great weight laid upon, itness of draught, and very properly too, the light of science, if not resolvable to an nomical practical issue, is not worth the dle. It is just possible, however, to be finical upon any point ; and if we could be ured of first-class workmanship, at say

1 cwt. of more traction-draught, we should not be disposed to cavil at the implement that was capable of doing the work. It has been laid down as a formula that the traction draught of a single horse yoke is $2\frac{1}{2}$ tons pressure upon the dynamometer. That is an extremely easy figure, not at all punishing to any team of agricultural horses. Their day's darg of ten hours will be little more than, at that ratio, a healthful recreation. All things considered, we should fix 3 cwt. as a proper and commendable workable pressure. At this rate, ordinary stubble ploughing could very well be done with two horses dragging a double-furrow ;* and it will be seen three horses are ample for any ordinary description of work, no matter what kind of staple the fields and the farms possess.

A FEW WORDS ABOUT THE ROLLER.

THE action of a roller is so simple, . apparently, that one could scarcely err ts application ; but, simple as it appears, it olves some considerations which are often t sight of, or not known, and where not own, tend to a very considerable loss of wer in using it. The weight of the roller : a great influence upon the crushing or verizing effect, but it is quite obvious that the case of hard lumps lying upon the sur- e of a soil comparatively soft, the weight y be placed upon them in such a y, that in place of being pulverized or mbled up, they may simply be crushed pressed into the yielding soil. The great ect, then, is to get the roller to act upon clods, that its weight shall tend to pul- ize them, and here comes in the influence the "diameter" of the roller. The larger diameter the easier it is to draw, but the aller is its pulverizing effect. Where the meter is very large, the roller has generallyendency to ride over the clods, leaving m comparatively undisturbed or uninjured. another action takes place ; if we examine ls, we find that, as a rule, they lie in such

a relation to one another, and have each such a peculiar formation, that there is *one* way in which we can *best* apply a force to break them up individually ; generally speaking, a sharp blow confined to one part of the surface, and in one direction, will smash up a clod better than if you apply a crushing weight to the whole or the greater portion of its surface, more especially if this weight is applied in such a way that it tends to force the clod laterally or horizontally, so as to crush it or press it up against its neighbours. The more striking the effect thus obtained, the more readily you can deal with each individual clod. Now, where the diameter is very large, such a breadth of surface of roller is presented to the earth, that the clods are acted upon so that they are pressed quietly into the soil, or pushed before the roller. By decreasing the diameter these effects are reduced ; but, as we have above stated, it is then more difficult to draw, so that a compromise between the conflicting claims of pulverizing effect and of

* It is a very clumsy implement, even on stiff land, that cannot plough two furrows each, 7 inches deep, with a traction-draught of $7\frac{1}{2}$ cwt.

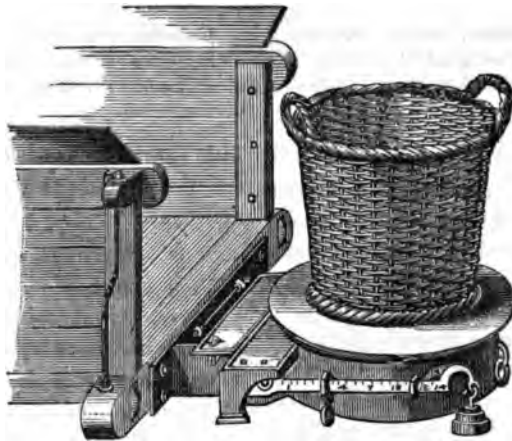
draught has to be made, which compromise has been found, in practice, to be the best when the diameter is made 2 feet. Weight with this diameter is most economically obtained by the use of cast-iron, which, in a length of 6 feet or so, gives 12 to 15 cwt. The implement thus arranged is a draught for two horses. The maximum of length, or bout of land, operated upon by two horses, would naturally be sought; but this length would increase, as it did increase, the difficulty of turning the implement at the headlands. To avoid this, the simple expedient of dividing the implement into two or three lengths was thought of, and by which, as one end was thus allowed to move at a different velocity on its central shaft from the other, the turning of the implement was easier. But not only was this advantage obtained by the division, but its operation, in the divided state, was found to be more effectual, and this still more markedly when three divisions were given to the implement, as was sometimes done. And why? Because the differential action of the rollers increased their pulverizing effect upon the soil. If we will suppose two discs to be placed on a central shaft, and at such a distance from each other as to admit of the placing of a clod of earth between them—suppose, further, the two discs have an equal rate of motion given to them—it is obvious that the clod of earth would simply be carried round by them, after the manner of a pair of

pincers. But give one of the discs an independent motion, and let the rate of this be either slower or quicker than that of the other, and we will find that, although the clod is still carried round, there is another movement brought about, and that is a rubbing one, upon the clod, caused by the difference between the speeds of the discs, one tending to hold back, the other to carry forward the clod, the resultant of the two movements.

For a long period the roller, made as above described, has remained without being altered in its general principle of operation; but of late, one or two alterations in arrangement have been introduced. Thus, for example, water is used to give the weight, the roller being itself the receptacle to contain the water, or the receptacle being made above the roller. It is evident that, by this arrangement, a varying weight can be obtained, giving a varying weight or pressure upon the soil. Mr W. N. Nicholson, of Newark-upon-Trent, has recently introduced an arrangement of roller, by which the necessity of turning the implement at the headlands is obviated. This is effected by placing the roller on a circular frame, surrounded by another which is moveable, and to which the horse-shafts are fixed; by a contrivance like the locking gear of a railway turn-table, the outer frame can be made to move independently of the frame carrying the roller, and thus the shafts can be moved round from one side to the other, without turning the roller itself.

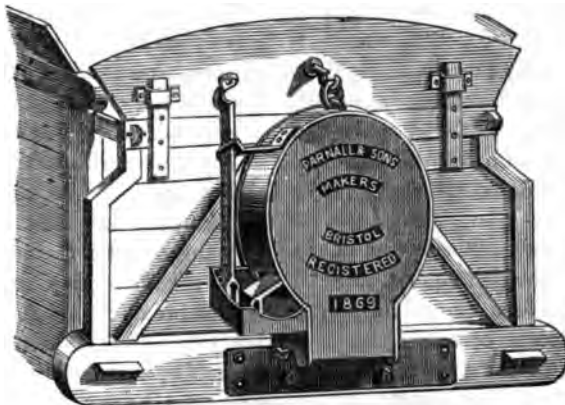
A NEW CART SCALE.

YOUR attention has been directed to a very ingenious weighing machine, which we consider well adapted for attaching to farm carts, when a farmer is desirous of weighing any commodity from $\frac{1}{2}$ lb. to 2 cwt. The price is 45s. complete.



Parnall's New Cart Scale in use.

maintaining the weight in the field of experimental or other crops. There are no loose pieces which can be dropped by a careless driver, and the box, in which the basket stands, contains the weights when the machine is folded up. Its



Parnall's New Cart Scale when not in use.

in its action; and we will merely remark that it is so constructed as to be readily attached to any cart or waggon on the farm. Its simplicity enables it to be managed by any farm labourer; and we have great pleasure in recommending it to the attention of our readers.

Our Pasture Grasses.

POA PRATENSIS* (Linnæus)—SMOOTH-STALKED, OR CREEPING-ROOTED MEADOW GRASS.

SYNONYMS.—*Gramen pratense*, common meadow grass—Gerarde. *Gramen pratense vulgatus majus*, the greater ordinary meadow grass—Parkinson. *Gramen pratense paniculatum majus*, or the large paniced meadow grass of C. Bauhin, 1671. And *Poa glabra* of Ehrhart, 1790. See also under the heading "Varieties."

DESCRIPTION.

ROOT perennial, consisting of fibrous rootlets, and thickly matted, strong under-ground spreading shoots. Stems usually from 15 to 18 inches high, erect, with three or four smooth joints, round, and quite smooth; leaf sheaths also smooth, the upper one longer than its leaf, and furnished with a blunt membraneous ligule. Leaves varying in colour from glaucous to deep green, flat, somewhat rigid, bluntly pointed, roughish on the edges and inner surface, but on the reverse, smooth towards the base, the lower ones spreading more or less horizontally from their erect sheaths. Inflorescence broadly paniced, erect at first, but drooping slightly on approaching maturity, the lower branches usually from two to five together, roughish, and all somewhat rigidly horizontal in their early stages. Spikelets slightly compressed, ovate, containing three to five florets, and frequently variegated with brownish green. Calyx, or under and outer chaff, composed of two nearly equal acute glumes, the upper of which is invariably three-ribbed; but in the lower the two lateral ribs are frequently absent, and the inner part of the central or dorsal rib is often flattened or seeds copiously from the outer and inner glumes. The outer one of the glumes is often five-ribbed, the inner one being five-ribbed, which are smooth, except on the lower portion of the dorsal and two lateral ones; inner palea very

little shorter than the outer, generally bifid at the point, and with two delicately fringed marginal ribs.

NATURAL DISTRIBUTION.

Very common throughout Britain in dry pastures, by roadsides, on wall tops, and gravelly banks, as well as in rocky or stony places; at all altitudes under about 3000 feet. It is also abundant in all other districts of Europe, and is frequent in Northern Asia, the north of Africa, Iceland, and North America; but its presence in different countries of the southern hemisphere is attributed to agricultural introduction and cultivation.

QUALITIES AND USES.

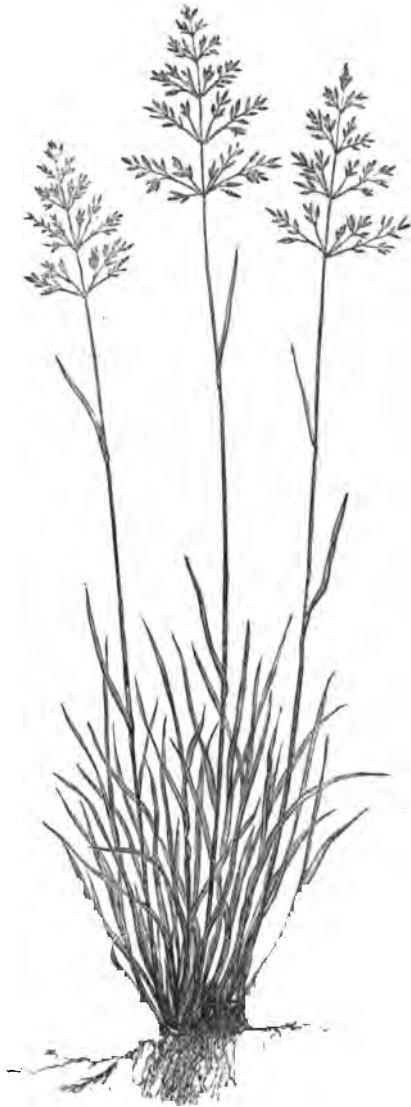
This was one of the native hay and pasture grasses which, after the common rye-grass, were first recommended for cultivation, and it was one of eleven kinds, the seeds of which were collected and sent to the Bath Society in 1781, by the Rev. G. Swayne, of Pucklechurch, for which he was awarded a premium of ten guineas. About the same time, or very shortly after, it was included among six sorts, of which Mr Curtis grew seeds for sale in his botanic garden at Lambeth Marsh. Dr James Anderson, of Monks' Hill, Aberdeenshire, saved seeds of it in 1783; and its name has held a place in agricultural seed catalogues ever since natural grasses were brought into general cultivation. Grown on a clayey loam, rich with vegetable matter, in the Woburn Grass Garden, its produce at the time of flowering was about 10,209 lb. of green

*From *Poa*, grass or pasture; *hor*, to feed; and *pratus*, meadow.



***Poa pratensis*—natural size.**

herbage, or 2871 lb. of hay per acre, the former of which had decreased by the period of seed ripening to 8507 lb., while the latter had increased to 3403 lb. And the produce of the lattermath, which consisted entirely of root foliage, was only about 4083 lb. of grass,



quality, and medium or lightish texture. Notwithstanding much that has been written in commendation of this grass, it is far inferior both in bulk and quality to many others, and is unworthy of cultivation, except in very dry places, where most other kinds are apt to be destroyed in seasons of extreme drought. Unusual earliness is the principal property which has been ascribed to it, but even this is more imaginary than real; for although it is one of the earliest to send up its flowering stems, several precede it in the spring growth of their root foliage. Its detractive characteristics are its powerfully creeping roots, which, like other root spreading plants, renders it exhaustive of the soil, which it occupies in unsightly patches, to the exclusion of more valuable grasses and clovers; its scant production of autumn growth or aftermath; the long retention of its rigid withered leaves; and for fine lawn grass it is further unfitted by the broad coarse-like appearance of its leaves, which are too hard for scythe mowing; and many of those are pressed too close to the ground for being caught by grass-cutting machines. The stems or culms of this grass are well adapted for the manufacture of straw plait, as, besides possessing the requisite tenacity, their perfect smoothness prevents bonnets and other articles made of it from being easily soiled.

SEED AND SOWING.

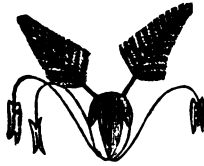
Several of the Poas, among which this species is conspicuous, are remarkable for the delicate cob-web like appendages at the base of their seeds, which, to the uninitiated, present the appearance of mouldiness, and has led to many disputes between seedsmen and their customers, from the latter fancying that it arose from the seeds being too old, or deteriorated from bad keeping. Portions of these delicate web-like attachments become dispersed in the operations of threshing, reading, and mixing the seeds; and being inhaled by unpractised operators, cause sickness, vomiting, and, in fact, symptoms akin to those of sea-sickness; hence instances have occurred in which the seeds have been deemed plague-infected, or mixed with some

y poison. These effects soon, however, off, and after a short initiatory practice, are no longer experienced. In length, seeds are about eight to the inch; about 100 of them are contained in a single ; and their average weight may be 1 at 13 lb. per bushel. Clean samples

the 11th of June 1849, shewed that the grass in a fresh state contained—water, 67.14; albuminous, or flesh-producing principle, 3.41; fatty matter, .86; respiratory principles (starch, gum, sugar), 14.15; woody fibre, 12.49; and mineral matter, or ash, 1.95. In a dry state—albuminous, or flesh-producing principle, 10.35; fatty matter, 2.63; respiratory principles (starch, gum, sugar), 43.06; woody fibre, 38.02; and mineral matter, or ash, 5.94.



x magnified.



Anthers, &c., magnified.

ed are, however, unattainable, as the mentioned web-like appendages retain of the outer chaff-scales, or glumes. The greatest number of seeds vegetate when the earth covering does not exceed $\frac{1}{4}$ inch; about half of that quantity when from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch; and none up when buried at the depth of $1\frac{1}{2}$

So that in sowing them, a finely re-l surface-mould, and covering in by a very fine grass-seed harrow or light is essentially necessary to secure a good . When sown alone on dry, gravelly, , or sandy places, where it is only ad- ble, 12 to 15 lb. of seed may be allowed acre, but when mixed with other kinds re suitable for like situations, 2 to 4 lb. nerally be sufficient.

CHEMICAL ANALYSIS.

: Woburn experiments shewed that at eriod of flowering, the nutritive matter quivalent to about 279 lb. per acre, at the time of seed-ripening had de- d to a fraction below 200 lb., and f the aftermath was about 112 lb., thus ng a loss of fully 79 lb. by delaying ; till the seed was ripe, by which time cks had not only become dry, but the aves had acquired a sickly decaying ance. The more correct analysis, by sor Way, of specimens collected in the y of Cirencester, when in flower on

VARIETIES.

This is one of the most variable of common pasture grasses, not only in the colour and breadth of the leaves, but also in the size and habit of growth presented by its different varieties; all of these agree, however, in possessing the powerfully-creeping roots which are characteristic of the species, as well as that peculiar smoothness which is felt on passing the fingers upwards over the stalks, and in having very short, abrupt leaf or sheath stipules. A very lengthy list of varieties and sub-varieties might be given; but assuming that the preceding description applies to the most ordinary or typical form of the species, the following are the leading variations which it presents, most of which are of little or no agricultural importance:—

1. *Poa pratensis alba*—or white smooth-stalked meadow grass—may assume any or all the varied habits and forms of the species;



Floret magnified.



Outer Palea magnified.

but is easily distinguished by whiteness of its floral appendages, the light green colour of its foliage, and the very light green of its stalks and panicles, which latter characteristic especially recommends it for the manufacture

bluish-green coloured, and its spikelets seldom contain more than three florets or seeds, which are very copiously webbed. The stems are shorter, and the leaves are also shorter, as well as broader and more flattened, while the panicles are smaller and less branched, than in the common *P. pratensis*, to which, according to the Woburn experiments, it was much inferior in weight of produce—except in that of the latter-math, in which both were about equal, its weight per acre, from a clayey soil enriched with bog earth, being only at the rate of 7486 lb. at the period of flowering, and 5445 lb. at that of seed ripening. Unlike No. 3, it is

most frequently found in inland and upland situations, both on light dryish and strong dampish soils, as well as on drained, peaty lands. The famous “Blue-grass,” of North American cultivators, has been considered a variety of *P. pratensis*, identical with, or at least nearly allied to this; but Dr Asa Gray, in his “Flora of the Northern United States,” refers it to *P. compressa*.

P. p. Umbrosa of Parnell.—A tall, slender, lightish green variety, with long, narrowish leaves, and somewhat drooping panicles, the branches of which are roughish, and the lower ones often in fives. Common in moderately-shaded woodlands.

The Farm.

STEAM CULTIVATION ON MAJOR STAPLYTON'S ESTATE IN YORKSHIRE.

WE have several times had occasion to bring before the public the name of Major Stapylton, of Myton Hall, Yorkshire, in connexion with general estate improvements, and it again gives us much pleasure in doing so. Major Stapylton is well known in Yorkshire as an extensive owner of estates both there and elsewhere, and during the last ten years he has shewn himself to be possessed of a spirit of improvement which is highly commendable, and worthy of imitation by others in a similar position. His estates in Yorkshire, which have undergone the greatest amount of improvement, are those of Myton Hall, near Boroughbridge, and Wass, near Coxwold Station, on the Thirsk and Malton branch of the North-Eastern Railway. During the last few years, these have undergone a regular overhaul in the way of draining, removal of old crooked hedges, and erection of more modern ones, laying out of more roads—made to traverse the more hitherto *uncome-at-able* parts of the estates—erection of bridges for the convenience of the tenantry, building of new farm-steadings, and commodious cottages for the labourers on the properties, and also in the formation of extensive plantations and heath. Other parts of his estates have also been improved, and he has been successful in obtaining the title of Baronet.

Up to within the last few years these moors have been entirely devoted to the rearing of game; but Major Stapylton very judiciously considers the subject of game quite secondary to that of the more profitable working of the land, and, accordingly, intends converting these hotbeds of the farmers' enemies into land fit for agricultural purposes. With this view, Major Stapylton lately purchased a very fine engine, and set of steam cultivating apparatus, from the Messrs Howard, of Bedford. These are to be worked on the roundabout system, but are capable of being connected at any time into a double-engine set, if required.

The apparatus was delivered at Wass on Tuesday the 18th ult. The engine, being a traction one, was made to convey itself and the ploughing tackle from the nearest railway station to the ground where the operations were first begun. This consisted of a distance of fully 3 miles, and embraces roads of various descriptions, both narrow and wide, level and hilly. From the village of Wass to the land about to be reclaimed, is a distance of nearly three quarters of a mile, and in that distance the road rises to an elevation of fully 300 feet above the village. The road here is very zigzag, and in some places rises as much as 1 in 10. This, however, the engine made her way through, dragging behind her the cultivator and tackle; and it was got into position for work on the following day.

The character of the land about to be reclaimed consists of a loamy peat, with a hard sandy subsoil, and between the surface and

subsoils is a hard *pan*, of an irony nature, about 2 inches in thickness, which has to be thoroughly broken up before it can become useful for agricultural purposes. This Howard's cultivator is now doing with perfect ease. The part on which operations are

at present being conducted is one which was ploughed about two years ago, the *pan* of which at the time was not broken up. This is now being done. We hope to be able to report more fully on its success at some future time.

THE BREEDING AND REARING OF LAMBS.*

By MR J. GREENE, M.P.

AS a member of this Club, although, from the nature of my engagements and the distance at which I live, I have heretofore only attended the annual meeting, yet, when asked by your secretary to bring forward some subject for discussion at the monthly meeting, I felt that although it may appear presumptuous on my part as an amateur farmer, I could not refuse to do so. As, however, much difference of opinion there may be as to what I say, and however exhausted the subject may be, the treating and breeding of sheep, all will agree with me, is a matter of vital importance to the farmer. I therefore, without further preface, only asking your kind forbearance, go on with the subject.

First and foremost is the selection of your ewe. We have arrived at a time when, in this country, we have lost our distinctive breed of sheep. Many here must remember when on most farms there was a flock of Southdown ewes; but as the price of wool and meat advanced, farmers turned their attention to getting a sheep that would clip more wool and breed a larger lamb, hence they crossed their Downs with a long-wool tup, and were handsomely repaid in their first cross. But as their Down ewes wore out, they commenced breeding from the half-bred ewe, and I am inclined to think if they had continued judiciously to tup with half-bred tups, which half-bred having either Sussex Down or Hamp-

shire Down on one side, they would have been more successful. I was favoured by that well-known breeder of sheep, Mr Lugar, of Ingham, with a sight of his flock of ewes, bred as I have described, and very even, well-formed ewes they are, combining both mutton and wool. His foundation was Southdown ewes. I am of opinion that although the black-faced ewe is a valuable animal for one cross, yet it is not desirable to breed from her produce, she not being a pure-bred animal herself—hence it is we see so many long-legged slow grazing lambs. I myself have bred from several different classes of ewes, and have found no animal gives me so good a lamb as a well-bred Hampshire ewe crossed with a Lincoln or one of Aylmer's tups; but from the necessity of frequently purchasing the ewes at a high price, I am about to test the merits of the Shropshire sheep, and for that purpose have selected some of the best bred ewes and tups I could find, combining the aptitude of the fattening of the Down with more size, and I expect to be able to carry, on the same food, more sheep than of the half-bred kind. Should this be the case, I shall be able to keep up my own flock without going to market.

In my remarks on sheep, it must be borne in mind that my experience applies chiefly to light land suitable to sheep. I believe the dry seasons we have had for two or three years previous to this have led many heavy land farmers to attempt breeding sheep, and unless they have a fair acreage of pasture

* Read before the Lavenham Farmers' Club.

I find the clipped ones grow faster on the same food. I tried a few lambs, and when I sold my lambs to a gentleman I now see in the room, I think he will bear me out that they were certainly not the worst among them. The lambs being off the ewes, are then folded on the layers, and I generally grow a bit of cole seed as a change of food, which is very essential.

I need not remark I am very careful not to put the lambs on layers that have been mucked or folded, as that will surely kill or injure them. Great care is required that the lambs have always water by them in summer. If you depend upon driving them to water, they may miss drinking one day, and the next will take more than is good for them. They should also have rock-salt. It is important when the sun is hot that the lambs should be put into the shade in the middle of the day. Besides the advantage to your land, and to your lambs generally, of giving them artificial food, you make a good price of your refuse. I sold three score of my refuse, not leaving one behind, this last September, at 24s. each; and I am sure, had they had no assistance, they would not have fetched more than 16s., so that in that lot alone I had £24 for cake. Layers, mustard, &c., being done, I begin with a few acres of white turnips, and then, about the 1st December, get on to Swedes, having them clamped on the land; they are cut by Gardener's cutter, and I never give Swedes whole.

Judgement is required, on every change of food, not to overdo your lambs. I always have a double fold and double set of troughs, so that the lambs are shut back and all the food put in the troughs first, which gives every lamb a fair chance, and prevents the strong ones pushing the weaker ones aside. I think ten score is the outside number that ought to be in one fold. In the middle of February I sell my hoggets, many of them fat; some one buys them to finish, and as "the proof of the pudding is in the eating," I shall probably sell them to a gentleman I see in his room, and you will most likely see them in Bury market, and judge for yourselves. I do not see how a farmer is to pay his rent

and expenses off a light land farm unless the gross price of his lambs comes up to the rent. I believe the advantage, both in corn, meat, and money, is in favour of keeping your lambs and sheep well. I never sell my crones and old ewes at less than from 35s. to 42s.—fresh, not fat—and take lambs, treated as I have described, on the 1st August to be worth 32s. each. Spend 3d. per head per week for artificial food up to 21st December—20 weeks—5s. per head; from 21st December to 21st February, is 9 weeks, at 6d., 4s. 6d., which brings the cost price up to 41s. 6d., and you may reckon on the average of years they will be worth 50s., leaving £8, 10s. per score for turnips, &c., the breeder having been well paid on the value of his lambs on the 1st August. If I was going to clip my hoggets and feed them off in summer, I should treat them as described, but at less expense for artificial food; but always bear in mind with every animal for meat, never to lose its young fat. Every pound of meat lost costs money to replace; a loss of 1 lb. at 9d., costs 8d. to put on, which makes 1s. 5d.

I must say, on riding about the country, I have observed in many instances a great want of management in sheep, but by keeping a strict eye to their well-doing they must pay. Mind, I am against extravagance in feeding animals. I believe much money is wasted in giving too much artificial food to both sheep and bullocks; they require a diversity of food, and can only assimilate profitably a certain quantity, but the more you mix cake with other descriptions of grain, in my opinion, the better; and though you may say I am recommending my own wares, a few grains will be found to assist lambs very much. Times are not now very cheery for farmers. The dry summer of 1868, and the light crop and low price of wheat in 1869, will prove trying to many; but put on a good heart, look well to your stock and land, both are grateful for good treatment. I have had forty years' experience in business, and have witnessed frequent changes of depression and prosperity, but have generally found the persevering succeed.

COVERED SHEDS FOR FARM-YARD MANURE.

IN a recent article under the title of "Farm-Yard Manure—Covered and Uncovered," we glanced in briefest fashion at some of the points connected with the subject: these had special reference to the making of manure in yards. We have now to direct the attention of the reader to the making of manure under special dung-pits or sheds; a method different in its mode of procedure, and, we believe, in its results, which are even still more favourable for manure made thus under cover, as compared with that made in the usual wasteful way described in an article we gave some time ago. It is certainly matter of surprise that so little attention is paid to the subject of treatment of manures, for the wasteful processes are much more numerous carried out than the saving ones. Even on farms held by men of acknowledged advanced opinions in practice, do we see that in this department their opinions and practice are by no means advanced—a condition of matters anything but satisfactory. It cannot be too often repeated that the alternative conditions of the atmosphere, dry and wet, to which uncovered dung is exposed, brings about a heavy loss on the fertilizing value of it—conditions which tend to break up, so to say, the bond of union which exists between the various fertilizing constituents, freeing them from that bond and allowing them to escape. But not only are the alternative conditions of dryness and moisture those which tend to destroy the value of dung, but the exposure to the sun's rays, to which uncovered dung is subjected, is even more prejudicial. This, we are aware, is a point not often alluded to in treating of the subject, but the most eminent authorities maintain that the loss from this cause is even greater than from those to which we have drawn attention. Every consideration, then, points to the value of a mode of treating dung by which it

will be saved the exposure now named. In our last, we treated of the covered dung in courts; we now take up the subject of specially designed manure pits or stances. These may be used as supplemental to covered dung courts, the dung being finally deposited in the covered dung-pit, or the manure may at once be taken there from the stalls, stables, and other stock-houses. The system of covered dung-pits originated on the Continent; at all events, if they were proposed here, we believe we are correct in saying that they were first carried out abroad. A covered dung-pit, properly arranged and constructed, is composed of three parts—1st, the pit proper; 2d, the roof and inclosing sides; and, 3d, the liquid manure tank. The pit is generally an excavation made in the soil, the depth of which is from 3 to 4 feet below the level of the ground. The shape is oblong, the sides being three times at least as long as the ends; at least this is a good proportion. The excavated portion is lined with brick, the walls being carried up a distance of from 2 to 3 feet above the level of the surrounding ground. The bottom should be made as impervious to water as possible, to which end it should either be puddled with clay to at least a foot in thickness, or lined with brick placed on edge, and the joints made good with hydraulic cement. We prefer to use concrete as the best of all materials for forming the floor. A few brief directions on the use of this may be useful here. The whole area of floor of dung-pit is to be dug out to a depth of 6 inches below the level at which the floor is designed to be finished; a layer of broken stones or round metal is to be laid uniformly over the whole surface, to a depth of 4 inches. The stones will be of the best size if they pass through a 2-inch ring. The concrete is to be placed over the stones, and is made by mixing three parts of pounded brick, or river or sea sand, with one of Port-

land cement. The whole should be laid on a flat board, well mixed together, and moistened with water, best applied over the heap with a common watering can, with a "rose" attached. The degree of moistening should be such as will enable the mixed materials to be worked easily like mortar. In laying the concrete, the operation should be begun

at one end of the floor, working gradually towards the other, so that no part shall be trod upon till the whole is finished. If any part is required to be gone upon, flat boards should be laid over the surface, which will distribute the pressure, and prevent the surface of the floor being damaged.

THE UTILIZATION OF SEWAGE.

GREAT national questions crop up now and then, demanding the serious attention of the Legislature, but we doubt much if there is on the *tapis* at the present moment a more difficult or a more important question to solve than the great sewage question. Its greatness places it beyond the machinery of ordinary management; and where extraordinary management is the article in demand, there are so many devices, plans, and projects gratuitously propounded, as to generate little else than doubt and distrust. Apathy and inaction are the necessary sequences, and the public, on the one hand, are compelled to inhale the noxious exhalations of their own excreta, and the country, on the other, to experience a loss, because of the drowning of the sewage into every river, tributary, and stream. Cities, towns, burghs, villages, all get rid of the obnoxious manurial matters in the most convenient way practicable; and the health of the people, the agriculture of the district, the farmer and stock-feeder's pockets, are all suffering from this mode of disposing of sewage. Old Father Time, in his wisdom, has given us the example of the Romans, who used to carry their sewage down the Tiber, and the Chinese, who used to carry theirs down the Yangtze. In our own country, the sewage is carried down the streets, and is then carried down towards the sea in search of a purifying station in the heat of summer, where it is carried up by the paddles of

steamers, not only disgusting to the olfactory nerves, but sickening and depressing to the whole system. Really such a state of matters cries aloud for instant measures; and what commercial centre will be bold enough and spirited enough to collect a fund sufficient, in the first place, to cause a sanitary revolution—nothing short will do—and, what is of co-ordinate importance, a sanitary success from a commercial or remunerative point of view? As Mr Hope well puts it in a paper read recently before the Institution of Surveyors—"The days of the existing state of things are numbered, and that the utilization of sewage 'has got to be done,' as the expressive Yankee phrase goes, and done it will be, for truth will triumph in the end, in spite of all opposition, and all assertion, and all apathy, which latter is so often the greatest impediment to improvement."

A great deal of capital in words is made of the do-nothing position of the agricultural element in this matter; and in some cases possibly not without show of reason. Looking broadly, however, at the question, the brunt of the blame lies at other doors. Corporations and Parochial Boards have evidently not considered this question so much from a sanitary, shillings, and pence point of view, as they might have done. They have spent thousands and thousands of pounds, not in collecting it, not in deodorising it, not in preparing it as an article of commerce, but in the concealing of it in all directions, in flushing it with valuable water down expensively-

wers, to discharge it eventually into stream or river, there to contaminate anything it touched, and render the pure air even unfit for the physical endurance of man.

Where the blame is laid at the agriculturists' feet it will be but fair not only to offer them a solution, but place it within their reach, at a price like a tempting price, and few will be stupid enough and stupid enough not to avail themselves of it. If the sewage is only available in a liquid form, then it is clear farms contiguous to centres of population are chiefly interested in its utilization. No farmer is so foolish as to refuse conveyance of what might be the raw material, upland and inland, and he will be attended with either satisfactory or unsatisfactory results. No channel of conveyance can at all cope with the usual means of conveying and distributing it by natural means; therefore, low-lying cities and centres of population are at a considerable disadvantage in preparing and maturing some form of drainage that shall eventually afford and utilize the sewage for the irrigation of the fields. If no complete scheme of drainage is found practicable, there is still the door left for deodorization, and for the sewage to operate upon in the many ways suggested, so as eventually the manurial matter, after going through a process of manufacture, shall be removed from the depots in a solid state, to form a fertilizer not second in importance to artificial manures of dealers. Until this is done and tested, farmers and agriculturists generally can do little. It is not their business. Once, however, offered them a likely, cheap and good, and there are plenty of them, and far seeing enough, to take it in with no sparing hand.

A purely commercial city man is apt to waste the talents of his rural compeer from a business point of view; but regarding the question, the agriculturist can turn the sewage upon him, with interest. It does not consummate ability, or even common sense, to go on, for example, as the Board of Works are doing, by permitting a portion of the sewage of London to be carried into the Thames rather than allow the Metropolitan

Sewage and Essex Reclamation Company to convey it down to the Maplin Sands. But this is just in keeping with official red-tapeism. The Board assesses the value of the sewage at so much, looking, of course, to the Barking gravel-pits; and rather than come and go in a great public question of this kind, they allow it to be drowned in the river, to pollute everything with its influence. The question, not only in the metropolis, but in all provincial cities, has been—How shall we get rid of the sewage? Parties interested never for a moment dreaming if it was worth their while to utilize it, in the first place, as a matter of business, and, in the second place, as a matter involving the increase of the nation's wealth and agricultural prosperity.

With the enlightened advancement of the present age, this unsatisfactory state of matters is not bound long to continue. Corporations must, in the first place, deal with the matter as a sanitary grievance that requires an immediate remedy, and steps should be taken to utilize this great public waste in some form or other. If, as was suggested by Mr Wallis in the admirable paper he read before the Hexham Farmers' Club, a guarantee of 3 or 4 per cent. were offered, plenty of companies would be forthcoming to take the matter in hand, and deal with it wisely and profitably.

The Metropolitan Sewage Company have rendered admirable service, as the annual pamphlet, written by the Hon. Henry W. Petre, from time to time has shewn. In their management of Lodge Farm, they utilize annually 300,000 tons of North London sewage. The farm of 200 acres, when taken in hand, was about the most unproductive that could well be conceived. About 120 acres have undergone a process of irrigation, and with what results the following quotation, for the year ending 31st of August 1869, will shew:—

During the year, 360,000 tons have been sufficient to render highly productive 120 acres of the Lodge Farm. Of this quantity, 53 acres have been in ryegrass, bearing an average of five crops in that time, absorbing about two-thirds of the whole quantity of sewage, and more than 50 acres have had two crops, thus making 120 acres of land bear 382 acres of crop in the year. The value of the crops in the grass grown

with the 360,000 tons of sewage is over £3200. As a specimen of the rapidity with which crops can follow each other with the aid of sewage, I may instance a field of potatoes which was planted in February with farm manure, and dug during June and July. As the land was cleared, cabbage was planted, and in spite of the very hot weather, the plants were well established. This crop will be cleared by November, in time for wheat, yielding not less than £20 net per acre. A plot of exhausted ryegrass, which had been cut four times since January, was ploughed up in July, and sown with white turnips, which will be off the land in November, giving £10 net per acre. It may be said that this succession of crops is attainable without the aid of sewage. No doubt it is under favourable circumstances of weather, and with a large supply of manure, but the advantage of the sewage lies in the fact, that the more unfavourable the weather for the ordinary mode of cultivation, the more certain the results from the use of sewage.

When such results as these, and others dwelt upon in Mr Petre's pamphlet, are pos-

sible, the utilization of the sewage of the country at large becomes a great and a national question. For lands where unconsolidated gravel and sand form the staple, it is the best of all reclaimers, because, while its manurial properties percolate the gravelly bed, the physical constitution of the strata will scarcely be impaired. Air, moisture, and manurial agents combined, exercise a potent influence in increasing the bulk of all root crops, of rushing up grasses, and yielding such returns as above given.

Let city men and magnates be therefore up and doing, as it is their duty, and interest as well; and the magnates of the land and their tenants, as above hinted at, will not be slow in exchanging for gold, and putting to usury, such valuable manurial agents.

ADULTERATION OF OATMEAL.

A NUMBER of the principal oatmeal millers and dealers in Scotland have combined to protect themselves and the public from a most reprehensible practice, which has been of late carried on to a considerable extent, more especially in country districts and among the poorer population in mining and manufacturing communities in all parts of the kingdom where cheap oatmeal is inquired after. The practice complained of is that of mixing the produce of other grain, such as barley and wheat, amongst oatmeal, and disposing of this mixture as if it were the genuine produce of oats alone, at a lower price than oatmeal made from pure oat grain. This practice has been carried on for many years, and has of late become more and more prevalent. It is a most injurious and dishonest trade, and one which has done much to ruin the health of the poor, and to bring about the prevalence of disease in many parts of the country. The adulterated article commands the entire market, and must continue

to do so unless the dealers chose to sell genuine oatmeal without profit. By mixing one bag barleymeal, made from light foreign barley, among three bags of oatmeal, a very passable meal can be produced at 3s. a bag under that made entirely from oats; while, by a judicious mixture of the cheaper portions of wheat, a still greater difference in price may be attained. Scotch oatmeal has long enjoyed the reputation of being perfectly pure, and there are great pains taken in selecting oats, as well as preparing the grain for oatmeal, by careful drying and milling, so that while the finest flavour is given to the oatmeal, the kernel is well separated from the husk, and then easily ground to the different degrees of fineness known in the trade by "round," "midcut," and "small" oatmeal.

It may be conceived with how much alarm the trade in Scotland looked forward to the gradual loss of reputation certain to accrue unless the evil practice of adulteration could be stopped. "The Bread Act," passed in 1836, during the reign of William IV., gives

power to any Magistrate or Justice of the Peace to grant a warrant to enter any house, shop, or other premises, and examine therein "any mixture or ingredient not the true produce of the grain, such meal or flour, shall import or ought to be, shall have mixed up with or put into any meal or flour in the possession of such miller, meal-maker or baker." The same Act also empowers Magistrates, "on the oath of one or more credible witness or witnesses, to impose a penalty, not exceeding twenty pounds, for offence, on any person selling either wholly or mixed any meal or flour of one

sort of corn or grain as the meal or flour of any other sort of corn or grain."

It is to set agoing the machinery of this Act against wrong-doers that the Association has been formed. As the authorities are led, at the instigation of the Society for the Prevention of Cruelty to Animals, to punish any person convicted of inhumanity to the brute creation, so it is hoped that this Association may be the means of punishing the equally inhumane culpable miller or merchant who, by selling adulterated food, would cheat the industrious and frugal poor in this the most wholesome and nutritious of all articles of food.

WOULD SEED FARMING IN VIRGINIA PAY?

AY, yes. Virginia is just the field in which an enterprising young seed merchant, with a moderate capital to begin with, will soon realize a competency. By the west of the South by the North, the Virginians have been compelled, for want of capital and labour, to offer lands equal to any other in America for the growth of grains, grasses, and all kinds of seed crops, at prices ranging from 5 dollars to 20 dollars per acre, in an advanced and organised community, with easy access to markets and seaports; and therefore at present an unusually good opportunity is offered for, say a seedsman's or nurseryman's to commence business in Virginia, with a view to supplying European markets with seeds. As regards the quality of land, it is as good as in any State in the Union. There is a great deal of very tempting land in Virginia, a large quantity of fair quality, much that was once excellent, but which has been exhausted by tobacco and husbandry. But the worst worn-out land that was originally good, is very easily improved.

"Apart from the mere labourer," said Mr. Peck, an American delegate to the General Chamber of Commerce, as recorded in the *Times*, "there are brilliant

openings in the South for men of small capital and of special knowledge." In this class may be included English seedsmen and nurserymen who, in Virginia, would be enabled to cultivate their own ground with one-tenth the amount of capital that would be required for that purpose in this country; and that State has one of the finest climates in America. Norfolk is the quarter in which I would recommend a settlement to be made. It may be considered to be the great natural port of the middle States, and, with a central position, splendid harbour, and railway communication to all parts of the Union, it is admirably adapted for a direct line of steamers between the Southern States and Liverpool.

I have just returned from Virginia, where I have been on a professional tour, and therefore your readers may place implicit confidence in my statements. One estate there of 1100 acres I could purchase for £5 per acre, and it consists of as good land as is to be found in England. Wheat grown on it produces from 30 to 35 bushels per acre; clover, ready for cutting, 3 loads per acre; orchards and a dwelling-house that cost 1800 dols. Three other estates of 1000, 1500, 1800 acres could be had, upon a lease

for five years, at 1 dol. per acre per annum. For a rent of £150, another estate, consisting of 800 acres of excellent land, could be leased ; but where the intending settler has the money to spare, the best way is to buy now while prices are low, and while estates for sale are plentiful. Labour, too, is cheap, especially black workmen ; but as soon as sufficient capital is imported into Virginia, to enable her to employ skilled white labourers, that State will doubtless be a gainer. From advices from New York, dated August 9th, as given in the *Times*, it appears that no fewer than 50,000 Coolie labourers have been actually contracted for by planters in Mississippi, Alabama, and Louisiana ; but these are chiefly for the

cotton-fields, and many look with regret upon the inpouring of a population of this description. Europeans would be greatly preferred, and especially Englishmen or Scotchmen. Therefore, let one or two, or more, of our great nurserymen's sons start on the co-operative system ; buy one of the large tracts of land now in the market, divide it among them, import white labour, and thus let the Virginians see that we desire earnest settlement and internal development of their State, which is what they want, and what they will be very pleased to encourage. I may add, that any further information which I can give is freely at the service of a little British pluck and capital set to work in the direction just indicated.—*J. N.*

GRASS LAND.*

By Mr CLEMENT CADLE.

IN treating the subject on the paper, "On Grass Land: when it can be profitably broken up, or when more profitably kept in grass," I will take the last part first, and shew the class of meadow or pasture land that I consider may be most profitably kept in grass, and then shew that which may be more profitably converted to tillage, and then give a medium course of treatment. As you will see, I only give general rules, for, as you are aware, in dealing with such a difficult subject, it is impossible to lay down any rule that shall not have many exceptions, in consequence of the varying circumstances, therefore circumstances must be the guiding-star in deciding the question. For example, arable land in one part will grow forty, and even fifty, bushels of wheat to the acre, whilst in another it will grow twenty-five ; or it may grow forty tons of mangolds, while other land will only grow sixteen. The class of land that may be most profitably kept in grass is—first, the feeding lands, where cattle or sheep will be kept during the summer months without the aid of artificial food ; secondly, where the grass covers not more than one-fourth the area of the farm ; thirdly, stiff heavy soils that will not grow much

to consume the roots on the land if converted to arable ; fourthly, some of the shallow pasture land having only a few inches of soil ; and, fifthly, those hilly fields that would be so expensive to work as tillage.

First, The feeding and fattening lands, where cattle and sheep will become fat during the summer months, without the aid of corn or artificial food. This class of land is no doubt the most profitable that a farmer can have, as it yields him a greater return, with less trouble and expense. It is more sought after, and commands a higher rent than any other class of land similarly situated, and, therefore, I would not propose breaking it up ; but a good deal may be done in the way of its improvement.

Second, Where the grass land is not more than one-fourth the area of the farm. Here a good deal of caution is requisite before coming to the conclusion that any may be profitably broken up, although in some cases it may. I should prefer in such a case to try and improve it in its present state by manuring, renovating with fresh grass seeds, consuming roots upon it, irrigation, and other modes of treatment ; but in some places the land is so light, and has such a tendency to grow couch-grass, that even this small portion of grass may be reduced with profit. One of the

ways of improving meadow land is to haul pots and fold the sheep upon the meadows, the same way as the arable land farmer would do his tillage, giving them a fresh pen every 3y. This means the meadow will be regularly dressed, instead of the sheep lying on those portions of the field that least require dressing, or in the old or some old hedge-row. This, with the consumption of plenty of corn or oilcake, is a new way of improving meadow land. If straw plentiful, it may be cut into short litter, and added about the pen each day, when it is trodden into the land by the sheep; and by this means the arable land is robbed of its manure, the increase in the hay will more than counterbalance it.

Fourthly, Stiff heavy soils that will not carry to consume the roots on the land if converted to arable. It is not desirable to break up such soils in particular circumstances; and sometimes it may be more profitably managed by a medium course of treatment, such as I will notice presently. Of course, the great drawback to stiff soils is, that you are so dependant on season for working the land to the best advantage; if you grow much of that improving crop—you have such difficulty and expense in digging off the roots, that it makes a material difference—so much so, that I should recommend not to improve it as meadow land. Some of this class can be profitably broken up (and is very well adapted) for wheat and beans, and for growing good mangolds. The consumption of manure, as before mentioned, renovating with grass seeds, boning, and other manuring, may be adopted to improve it. Another mode is planting apple and pear trees; for, if the far-ouled manufacture the materials he produces without restriction (sugar and spirits, for instance), a new era would dawn upon this class of pasture land. It appears to me that sugar can in no way be so cheaply produced in this country as upon the apple or pear tree. No digging, hoeing, ploughing, manuring, &c., is required as in growing beet; the only expense is to plant the trees and pick the fruit. The principal drawback is that you cannot ensure a crop every year; but ten or twelve tons of apples per acre are no uncommon crop, and the value of these fruits is continually increasing, in consequence of the demand in the manufacturing districts.

Fifthly, Some of the shallow soils that are only a few inches in depth. A good deal of the best land comes under this head, and of this

class of land I cannot say I have had much experience; but, of course, if only three or four inches of soil is available, it is useless to attempt to make good tillage, although some of these light soils make very fair turnip and barley land, as on the oolite (Cotswold Hills, for instance); and here the preferable system seems to be to lay it down to sainfoin for a term of years, and the quantity of sainfoin hay sometimes produced per acre is astonishing.

Fifthly, Those hilly fields that would be so expensive to work as tillage. I have had a good deal of experience as to the expense of working hilly arable land, and my belief is, that the difference in the expense is never estimated high enough, for, besides the extra labour to the horses, you cannot get anything like the quantity of work of any kind done as you can where the land is level, especially in ploughing, hauling on manure, couching, and cleaning the land; but circumstances often do arise where this hilly land is so poor and bad that something must be done, and I will not take upon myself to say it may not sometimes be profitably broken up, especially where the larger proportion of the farm is pasture, but in all probability the medium course is preferable.

I will now give the class of land that I consider may be profitably converted to tillage. There are so many points to be considered, many of them of such a slight and trivial nature, all to be taken into account before a decision for or against can be arrived at, that I hardly know how to enumerate them. However, some of them would be, adaptability to homestead and buildings—if the field is situated a long way off from this great desideratum for arable land, it would be a great drawback; then as to its growing corn—some land will not grow more than 20 or 25 bushels under any circumstances; then it may be very wet and difficult to drain, or it may be shaded by trees, or adjoining covers abounding with game. The temperature and rainfall has also an important influence as to the decision of converting grass into arable. Ireland and some of the western counties get too much rainfall for growing wheat to the best advantage, while in many of the eastern counties they do not get enough to grow good roots. A rainfall of about 30 inches appears to be the quantity to enable both roots and wheat to be grown to best advantage. Temperature again is, I believe, an important feature; it appears to be necessary to bring wheat fully to perfection to have a portion of the summer equal to a mean temperature of 60 deg. of heat, and situated not higher than 600

feet above the level of the sea ; still, for our purpose, many of the lands I would propose dealing with are, under all the disadvantages mentioned, capable of growing splendid roots and oats, and especially potatoes.

The following may be enumerated as the most important sorts of land that may be profitably broken up :—1st, The high and dry land that will carry sheep well, especially where the pasture land is more than half the area of the farm. 2d, Where the pasture exceeds one-third or one-fourth the area of the farm. 3d, The alluvial deposits or loamy soils by the river and brook sides, where the stream runs so rapidly, that in the formation of the land only the coarser sand and gravel is deposited, and consequently the finer particles of clay so necessary to make up a good fattening soil are taken on by the floods to a more level place. 4th, Some of the *loamy* soils that will *not* carry sheep, where the land is convenient for buildings, and the pasture exceeds half or one-third the area of the farm. 5th, The *clay* lands that will not carry sheep, but, when drained, grow the best of roots and plentiful crops of corn, and where the pasture exceeds half the farm.

The first on the list of pasture lands that may be profitably broken up is the high and dry inferior pasture land that will carry sheep well, especially where the pasture land exceeds half the area of the farm. Here much of the class of pasture is poor and dry, and principally grazed with sheep, which bite the few fine grasses so closely that they are gradually lost, and from its tendency to grow couch-grass, the grazing with sheep increases this tendency, and thus retards improvement, as they do not like to eat it unless it is kept very closely grazed, consequently it gradually kills the finer grasses. This is the class of land that may be most profitably converted to tillage, for roots can be grown and consumed on the land, and 1 acre of roots and 1 acre of clover or seeds, with the wheat and barley *raw*, supposing it to be farmed on the four-course system, will keep a good deal more stock than 4 acres of the original pasture ; and surely one acre of wheat and the acre of barley will pay for extra labour and capital. If the pasture land is one-half the area of the farm, there can be no objection as to the desirability of breaking up, especially as the roots can be consumed on the land and by sheep. Under some circumstances, the better class of lands may also be broken up with advantage.

Second, Where the pasture lands exceeds one-third or one-fourth only of the area of the farm.

Here a little more consideration is necessary, for I consider one-third pasture to two-thirds tillage the most advantageous proportions to make the most of a farm. Still, there are many cases that have come under my notice where even if only one-quarter of the farm is pasture, some of that quarter may very profitably be converted, if the land is very good, for growing roots and corn, and bad for grass. Where sheep are the principal stock kept, there is not the necessity for so much pasture, as they can be kept in the summer on the clover and artificial grasses, eked out as their keep now is by mangolds, corn, and cabbage, during the summer months.

Third, The alluvial deposits, or loamy soils of the river or brook sides, where the stream runs so rapidly that in the formation of the land only the coarser sand and gravel is deposited, and, consequently, the finer particles of clay, so necessary to make up a good fattening soil, are taken on by the floods to a more level place. I have had some experience of this class of land, and, where it is not very liable to floods, it makes some of the best tillage obtainable. On the banks of the river Wye, which is a very rapid river, there is a good deal of this class of land, especially between Hereford and Ross, combining all the requirements for growing corn, and keeping sheep, but which will not fat cattle, and would be doubled in value by being converted into arable land.

Fourth, Some of the loamy soils that will *not* carry sheep, where the land is conveniently situated near buildings, and the pasture exceeds one-half or one-third the area of the farm. This is a little different from the last class of land, inasmuch as the farmer has the expense of carting off the roots ; still, under the circumstances mentioned above as to buildings and with a sufficiency left, some of the pasture may be profitably broken up to tillage, but more care is requisite than in the former cases.

Fifth, The clay lands that will not carry sheep, but, when drained, grow the best of roots and plentiful crops of corn, and where the pasture exceeds one-half the farm. This is the most difficult class to define, as to converting it into tillage for a permanency or not ; still, if the pasture exceeds one-half the farm, it may often be profitably done where it is well adapted for stock and convenient to the homestead, and a further advantage may be gained by breaking some up and growing roots, these roots to be taken and consumed by sheep on the other pasture land, as already explained. Having now disposed of the land that may not be broken

also that which may be profitably converted into tillage, I come to a very large class that has been to some extent passed over, the poor heavy clay pasture, down lands, and mountainous tracts of land, and numberless lands that will suggest itself to your mind that is not first-class for growing corn, but may be made to produce greatly increased crops of grass by the medium course alluded to, which is its being simply broken up to tillage for two or three years and sown to grass.

It is a mistake to plant the seeds of corn if laying down for four years or more as permanent pasture, for if you get a good crop of the young seeds, and if a poor crop it (the expense) is no better than the extra labour worth. I would suggest the following:—

1st, To plough, or breast plough and burn (if the soil is very loose and spongy), and then take a crop of oats, then wheat, and next turnips, and then after turning off the turnips prepare the ground for barley, and not put the barley, but seeds, for two or four years' ley, consisting of 4 lb. of perennial, 3 lb. Italian rye-grass, 3 lb. of clover, 2 lb. Timothy, 2 lb. meadow fescue, 3 lb. cow-grass, 3 lb. white clover, 1 lb. alsike, 4 lb. trefoil. This, of the best quality, should not cost more than 22s.

2d, These should on no account be grazed the first year, but mown in September, and again in the following summer, before any seeds are sown in the plant, for as the roots of plants increase in proportion to the top, you will get a longer plant than by grazing and keeping it short; it may then be grazed for two or three years and then ploughed for wheat; then harrowed and cleaned and planted with turnips, and so on for three or four years. By this means, the crops are greatly increased and may be grown on the colder heavy land that would not bear permanent tillage.

In concluding my paper, I will refer to one thing that you will, no doubt, have observed I have scarcely touched upon, and that is that the land should be treated in breaking up. Years ago I should have had no hesitation in giving my opinion on the course to be pursued; but I have been since engaged in making a deduction of the Clun Union, in Shropshire, of some 85,000 acres, 15,000 to 30,000 of which has probably been enclosed in the last twenty years, I had special opportunities of witnessing a great variety of

ways in which this land was treated in being broken up to tillage; and when I saw that the owners of, perhaps, three adjoining fields would each adopt a different course, I came to the conclusion that no one system could be much better than another as to be indiscriminately recommended. There are three common modes of treatment, and it must be left to the farmer himself to decide which he considers best for his particular case. 1st, To breast plough and pare and burn. 2nd, To pare and store the turf up in heaps to rot. 3d, To double plough. Where the land is very spongy, and infested with insects, perhaps the first is preferable, especially if there is any difficulty in getting it firm enough to grow wheat; but as by this means you lose vegetable matters, if you can do without the burning it is better, while if stored in heaps you always have a reserve of manure either for that field or any other; but, at the same time, there is the expense in both these systems, which is considerable. The first seems to be preferable on the oolite and lias formations; on the latter, especially, is burning to be recommended. Mr Randell, of Chadbury, near Evesham, has done wonders with his arable land by burning it, but on the sandy and lighter soils burning would no doubt be wrong. Whatever system is adopted, it will almost always be necessary to lime heavily with fresh quick-lime, for old turf appears to get in a kind of acid state, and these acids sometimes require neutralizing before the land will grow corn well. Mustard and rape, seeded on newly broken-up land, I have seen recommended; but as I have had no experience in this, perhaps some gentleman who has will give us the result. I will now conclude, as I have given you the class of land that ought not to be broken up, that which may be, and also a medium course, which I believe might be very often profitably adopted on each class of land, and be the means of doubling the increase of food now obtained from much of the inferior pasture even on hill and mountain land, and which I have every confidence in recommending to your notice, from what has come immediately under my own observation; and if, from our discussion to-night, we can shew that even one-half the 22,000,000 acres of grass land in Great Britain and Ireland can be improved to the extent of 10s. per acre per annum, we prove that a saving would be effected to the country equal to £5,500,000 every year; and, therefore, I think our labours will not have been in vain.

of the remarkable weight of 62 lb. per bushel, and the consequence was that, to his great astonishment, less than one-third came above ground, the rest perishing, the vital part of the grain being either removed or destroyed during the action of over-dressing. Such facts may be recorded of the other grains. Farmers should always buy cereals for seed purposes by the natural weight, and all over-dressed grain should be decidedly refused, as unfit for being put into the soil. In conclusion, three of the most essential

things to be remembered in the purchase of grain for seed purposes are—1. Purity of the variety. 2. Freedom from mixture with other kinds. 3. Freedom from all indication of decay or degeneracy. If these points are attended to, not only will the quality of our seeds be improved, but the productiveness of our soils increased. The only other circumstance we would notice is, that the seed should be free from seed weeds. It is quite sufficient to sow the grain without a crop of weeds, because both cannot do well in the same field.

STEAM CULTIVATION.

MR WM. SMITH, Woolston, Bucks, writes the following interesting letter to the *Times* regarding the present state of drainage in Essex, and the important saving that would be effected by the general introduction of steam-power culture upon the land in that county. Mr Smith's report shews very clearly the present inadequate system of drainage in some of our principal counties. At least the state of matters in Essex is a very fair specimen of what takes place in several other counties; and not the least surprising thing in the matter is this, that farmers are to all appearance perfectly willing and content to allow their farms to remain as they are, although they are quite aware that the waste which goes on every year must be something enormous. The letter from Mr Smith is as follows:—

"The other week I was employed by a landlord to visit a farm in Essex, and to report as to its fitness for the adoption of steam-power culture upon it. The following is the substance of my report, but, before giving it, let me tell you what I saw on my road by rail from London to the farm, some 15 miles below Colchester.

"The land had, been mostly ploughed in stretches upon the well-known Essex plan, with its furrows and water-furrows to keep it dry, or rather to let the surplus water run away. This has not been a wet winter, yet water could be seen either standing or flowing in the majority of these furrows and water-furrows, thereby proving that the land was as full of water as it could hold, and that air was completely barred from entering the soil to warm and nourish the young planted wheats; and, worse even than that, the rain that falls daily upon this water-clogged land passes away to the sea, carrying with it not only the good contained in rain water, but all the manure that it can wash out of the land with it, and on recently manured lands that is very considerable. What are the Essex landlords and farmers at in allowing this waste? They cannot have a knowledge that air and rain water are our cheapest muck-cart, for we have nothing to do but to put our land in a proper state to pick up the

good fertilizing qualities from both. They tell us that draining is of no use on their soil. I will hereafter prove that it is.

"The farm that I visited contains 320 acres, about 280 of it under the plough, and the remaining grass, buildings, &c. The top soil is rich in vegetable mould, yet poor in lime. I had a good chance of seeing the subsoil, for Mr Bailey Denton's men were at work in four fields on several parts of the farm draining it 4 feet deep. It is generally yellow clay, with here and there a small patch of fine sandy soil. The undrained portion of the farm shewed the water standing in its furrows and water-furrows, yet the land recently drained shewed none, and the reason why could be seen by looking at the outflow of the main drains, a large flow of water pouring from them after having passed through the soil; and we all know that as it passed through the soil air would force its way into the soil to nourish the young growing wheats. This proves that the Essex men generally are wasteful with both water and air—that is, they keep the door of their land shut against both. Fourteen horses are kept to work the farm, and the cropping recommended by the tenant is as follows:—Roots, barley, clover, wheat, barley, beans, and wheat. This appears to me to be a suitable cropping for this soil, and under steam-power culture it would work well. The land is generally clean, and in a very fit state upon that point for the adoption of steam culture. It is flat, and there is nothing in the way in the shape of a hedge, for the landlord allows all needless ones to be cleared away. The tenant tells me that he pays from £40 to £50 a-year for threshing his corn.

"If steam-power culture is adopted on this farm, seven horses may be sold off, for the remaining seven will be enough to cart the corn at harvest (and easily, too, for there are besides the yards and barn, &c., at home, two field barns and yards, &c., at two different points on the farm) and do all the ploughing that is needed, the cross cultivation, seeding, &c., and all the job work throughout the year. This, in the winter and summer months, will not half employ them.

"Now, let us look at the cost of starting steam culture on this farm upon the Woolston plan. A ten-horse power engine, £300; a set of tackle, with all the implements needed, £220; coal for the year, £20—total, £540.

"The half of the engine, £150, may be charged to threshing, for the £40 or £50 a-year paid by the tenant will soon clear that off with the cost of a threshing-machine. The seven horses that may be sold off at £30 each, give a sum of £210. The keeping of seven horses, sold off for a year, at £25 each, gives a sum of £175. These three items together make a total of £535 saved; therefore, it may be seen that, in this case, the tenant may make the change from one system to the other, with only £5 additional tenant's capital on steam culture the first year, and that every year afterwards he would make a clear saving of £155 in horse keeping, after allowing £20 for the year's coal.

"Now, let us see what steam-power work there would be needed on this farm with the Woolston system strictly carried out.

"First year, for roots after wheat, say 40 acres.—The wheat stubble should be manured in October. The ridger and subsoiler should be set to work by the steam-engine to work it a foot deep, and put in ridges for the winter. In the March following, when the land is dry, a subsoiler should be drawn by four horses along each ridge to split them; after this, if intended for mangolds, it may be harrowed once, and the seed drilled in; but if for Swedes, it should be scuffled across once, either in April or May, and then harrowed, and when seed time comes the seed may be drilled in.

"Second year, barley after roots, 40 acres.—The horses may do this in the ordinary way in the spring, for they will have nothing else to do at that season, excepting job work.

"Third, clover, 40 acres.—This does not need an operation of any kind.

"Fourth, wheat after clover, 40 acres.—The horses may plough the clover ley over, for they can do it better than steam-power can, and they will have nothing else at that season to do, excepting the cross cultivating, drilling, and job work.

"Fifth, barley after wheat, 40 acres.—This must be ridged and subsoiled by steam-power, a foot deep in October, and laid up for the winter. In the spring

the ridges must be split by horses drawing the subsoiler along them; after this, it may be cross-cultivated once across with horses, or harrowed, according to circumstances, and then drilled.

"Sixth, beans after barley, 40 acres.—This must be ridged and subsoiled by steam-power, and it may also be split by horses in the spring, and then planted with beans, one row on each side the ridge, placing the row from 18 to 20 inches from row to row, or, in wet seasons, it may be planted without the splitting in the spring with horses.

"Seventh year, wheat after beans, 40 acres.—This must be smashed by steam-power, then cross-cultivated once over with horses, and the wheat drilled in; and I would advise the drill-rows to be 12 inches from row to row for wheat on all occasions.

"By this it may be seen that the steam-engine would get four fields, or 160 acres a-year, to do. If we fix 2 cwt. of coal as the quantity needed per acre, 16 tons a-year would be the consumption. This shews that, by allowing £20 a-year for coal, I allow ample upon that point. It may also be seen that the horses get only the barley seeding in the spring after roots, and the ploughing of clover ley in the autumn, with the cross-cultivating, drilling, and job work, and that would be all; therefore, the seven would get but lightly employed throughout the year. Such being the case, young growing horses may be kept and sold out at a profit, instead of getting worked to death upon the farm.

"As the land is deficient of lime, I would recommend a light dressing of superphosphate, on at least three of the crops during the seven years. This, with the aid of steam-power for culture and drainage, must increase the production on this farm vastly.

"This shews how to apply steam-power to culture on many of our best soils, and that the adoption of it is not so costly as many people fancy it is. If you think this worth a corner in your paper, you will publish it, and thus shew to the Essex men, both landlords and tenants, that their young wheat plant at this season is like a man in deep water, with his head only up, struggling for life, crying 'help, help.' Drainage is the help needed by the Essex farmer, and deep drainage, too. Steam culture stands next; the two together must vastly increase their produce."

*SHEEP FARMING ON STRONG LAND.**

By MR WILLIAM BELL, of Harlow Hill.

THIS subject has frequently engaged the attention of all concerned in the cultivation of strong and more especially in Northumberland, where of this kind is so extensive. Taking into consideration the improbability of a permanent rise in the price of grain, the increasing demand for labour, and, on the other hand, the enhanced price of butcher-meat and the consequent demand for pasturage, it becomes all the more imperative that the subject should be considered in all its bearings, and some decision arrived at as to the best mode of applying it to feeding purposes.

On such soils, the cereal crops are chiefly depended upon, and in the preparation for them, if the future cannot be curtailed, or an increase takes place in the price of the produce, or crops of a more valuable description can be substituted, it appears to be very improbable that, after the improvement effected by drainage, the land will be much further increased in value. By the use of manures and management, it may be brought to a higher state of cultivation, thereby yielding a larger produce; but too frequently, as soon as the manures are withdrawn, it recedes to its former state. The less retentive portions, turnips, rape, and cabage, may be grown; but it is important to inquire whether these can be grown to advantage. For such it is essential to have the land prepared and the crops sown in proper season.

There exists a diversity of opinion as to whether the arable soils, capable of green crops, can be more advantageously employed in the feeding of stock than in growing grass. I will endeavour to shew the number of sheep likely to be profitably fed on the turnips on such land, worked on the four-course system, assuming the roots are drawn off the land as early as possible—stored up and consumed upon a dry and sheltered pasture, care being taken that the land, which they are fed on, is sufficiently dry to prevent it from being poached or cut in the operation, otherwise it not unfrequently follows that a deficiency is experienced in the yield of the succeeding corn and hay crops.

I may here mention that sheep fed under the four-course system consume a less quantity of food, and are increased quicker; but by such a mode I don't think much to be gained; they require considerably more attention, and if laid on to grass in the spring, it is noticed that they do not make the same progress, or feed so quickly as those fed in the usual way. On the extent of strong land a man and a pair of horses are able to cultivate on the four-course system, and the fourth being turnips, is 44 acres. We have first

11 acres turnips, averaging say 44 tons per acre; and as a sheep cannot be depended upon leaving more than 3s. 4d. per month, and will consume in that time about 7 cwt. of turnips, the 11 acres of turnips will carry seventy-three sheep six months, leaving £73; 11 acres of barley, 5 qrs. per acre, at 28s. per qr., £77; 11 acres of hay, 1 ton per acre, at £4 per ton, £44; 11 acres of oats, 5 qrs. per acre, at 20s. per qr., £55; 11 acres of oat straw, £11—making a total of £260 for the 44 acres. The straw and hay supposed to be eaten on the premises, and the manure made to be applied to the land for the corn crops.

From the above we must deduct expenses as follows:—Keep of horses, wages for man, small work, blacksmith and joiner's work, &c., £110; seed for the above-named crops, £17; manure for turnips, £27, 10s. From the average value of crops, we may put down rent, including rates, at 28s. per acre, *i.e.*, £61, 12s.; total, £216, 2s. The capital required will be six times the rent, or say £369, and the amount of profit, after deducting the expenses, being £43, 8s., is at the rate of £11, 15s. per cent., for interest on capital, management, and casualties. You will perceive by those figures that the average yield of crops has not been taken, but is still liable to be affected by unfavourable seasons. Assuming such land to be worked with a bare fallow, 60 acres will be as easily cultivated with the same capital and at the same cost as 44 acres with a root crop; and calculating on the same principle, making allowance for extra small work and manure which the root crop requires, it will be found to leave £13, 10s. per cent., shewing that the advantage of a turnip crop on strong soils is more than met by the additional cost it is attainable at.

From the above calculations, it would appear to be unprofitable to grow root crops purposely for the feeding of the sheep on soils where they cannot be advantageously consumed, though, when horses are not kept solely for the purpose of working the whole of a strong fallow quarter for a root crop, to a certain extent a portion may be grown to advantage to assist in breaking up the straw, and carrying store cattle and sheep over the winter. On fine-working soils, the result is entirely different, they being worked at considerably less expense, and the roots drawn off or consumed on the ground, and the land ploughed at almost any season without incurring scarcely any risk to the succeeding crops.

How, then, are we to keep pace in supplying a population increasing at the rate of about 200,000 per year with butcher-meat? It has been suggested, to

**Read before the Newcastle Farmers' Club.*

increase the stock in this country, that a prohibition of the slaughter of lambs and calves would be beneficial ; but when we consider that even at present no hay, straw, turnips, or grass, go unconsumed, it appears such a mode would only tend to enforce the slaughter of older animals. The impossibility of increasing the stock without first increasing the articles of food for them, must be evident to all ; and the weekly variation of about 2s. per stone in the quality of cattle sold in our fat markets, is a proof that there is an ample supply of store stock in the country, and a scarcity of food to bring it to perfection.

On looking at the agricultural statistics which have been recently issued, we find 870,857 acres standing under the head of bare fallow. Now, supposing it be cultivated on the four-course system, which is likely to be most generally adopted on inferior soils, we have 3,483,428 acres of this class of land in England and Wales, and, judging from what we see around us, comparatively speaking, doing little towards the keeping and feeding of stock. Then what might we suppose would be the result if a large portion of this description of land was laid down to pasture—taking, for instance, the 44 acres to feed seventy-three sheep six months, and assuming it to be sown away with a spring corn crop? The capital required will be about £9 per acre, or say £396, viz., 30s. per acre for seeds, 50s. per acre for manure for a top-dressing in the spring following the cutting of the corn, leaving £5 per acre for the purchase of stock, management, &c.

Now, it may with safety be estimated that 1 acre will carry two sheep throughout the year, and a sheep calculated to leave 2s. 6d. per month. We find, on deducting rent, that the 44 acres will carry eighty-eight sheep, and leave a profit of £17, 15s. per cent., less the usual losses a sheep farm is subject to, against 44 acres arable feeding seventy-three six months, and leaving £11, 15s. per cent. And assuming out of 3,483,428 acres of this kind of land there are 2,500,000 on which, from the nature of the soil, a root crop cannot be advantageously grown ; and supposing it, after having been laid out by draining, to be sown to grass in such a way as to enable it to carry two sheep to the acre, by this means the sheep stock of this country would be increased by 5,000,000, and mutton and wool produced to the value of £7,500,000 per year. And as a sheep leaving 30s. should produce 2½ stones of mutton, the addition to the country in butcher-meat would be 85,937 tons, and equal to a yearly importation of 343,750 foreign cattle, averaging 40 stones each.

From this statement it must not be inferred that it is most beneficial to graze new lands solely with sheep, or that they will convert grass into a greater weight of meat than cattle, but merely to give an idea of how our home supply of animal food might be augmented. The supply being regulated by the demand, stock of either description would be reared accordingly. Nor do I think any serious loss need be apprehended to the country in corn and straw.

Papers by Tim Bunker.

XXXII.—TIM BUNKER'S HAY CROP.

A NEW CASE OF THE BLACK ART.

R. EDITOR,—“Eleven tun of hay on that mash! Who would have t it three years ago!” exclaimed Seth, as he knocked the ashes out of his pipe, and proceeded to load again.

“Did you say eleven tun, Squire Bunker?” Deacon Little, as he leaned over his shoulder at me, with his mouth open in assent, as if he thought somebody must have been lying.

“It beats my drained swamp all hollow, I got two tun to the acre the first year seeding down, and I thought that was high to keep an extra holding on,” chimed in the Jotham Sparrowgrass.

“Eleven tun on four acres of barren salt where grass tried to grow, and couldn't, three years ago, is a leetle miraculus, ain't it, Squire?” asked Jake Frink, looking over his shoulder at the minister, with as much deference as if he were a professor.

“The Bible says we are to have a new heaven and a new earth, and I think Squire Bunker is probably fulfilling the latter part of prophecy,” replied the minister with a sort of smile, that left one in doubt whether he was in earnest or not.

“These remarks of my neighbours on my drained marsh are a great contrast to the drained marsh three years ago, when I first undertook the job. I have not said anything about improvement yet, because I did not know how it was coming out. You know the water flows a long way up our great river, all along the banks, at the mouth of the river emptying into it, and along it we have marshes bearing a great abundance of salt grass—a poor article for fodder, but very good for mulching, and manure. I had a great deal of acres lying just below the lot I bought of

Jake Frink, where I cured the horse-pond. There was not much to be done to it, but to put in a tide gate at the culvert, and to do some ditching, to shut off the sea-water. I thought if I could do this, I could bring it into good meadow with very little expense.

I talked the matter over with some of my neighbours, and they all said it was of no use. But I hold that man has a natural passion for creating new things. This shews itself in all children, as soon as they get out of the cradle. They begin to make hills in the dirt, to dig out small pond holes, and fill them with water, to build houses and mud forts, to make boats as soon as they can hold a knife, and to exercise the creative art in general. I thought it was a very natural and human thing for me to undertake to create a piece of meadow. It was all the more natural for me, because I wanted a few more tons of hay to winter my cattle on, as I could pasture more in the summer than I could carry through the foddering season without buying hay.

But Deacon Little seemed to think it was a presumptuous thing, and a little nearer to sacrilege than anything should be up here in Hookertown. The deacon, having passed his fourscore years some time ago, is one of the good old men who belong to a former age, whom death seems to forget, they are so exemplary in all their deportment. The Bible is not only his authority in all religious matters, as it should be, but in every thing else. He at once brought my project to this test. Said he to me one day:—

“It is of no use, Timothy—‘a salt land and not inhabited,’ is written in the Bible, and you might as well expect English hay on the plains of Sodom, as on that mash.”

“But salt grass grows there now, and if you shut off the sea-water, why will not the fresh grasses grow?” I asked.

"Ah! Timothy, you forget that the Almighty made that a salt mash, and His works are perfect."

"Perfect for some uses, but not for ours. He has made me with brains to make new creations, and I shall try to make that piece of land over again."

"You are a sorry infidel, Tim Bunker, I am sorry to say it," and the old man left me, with a very poor opinion of my reverence for the Divine workmanship.

My other neighbours had as poor an opinion of my judgment and good sense, as the deacon had of my veneration for the Bible. At the time the gate was put in, they were all on hand to see the new hobby.

"What new-fangled consarn's that?" asked Jake Frink.

"How is it going to work?" inquired Seth Twiggs.

"Ye don't expect that door will shet itself, and keep the water eout, dew ye?" wondered Tucker and Jones.

"A great piece of folly?" exclaimed Uncle Jotham. "Ye see, this thing has been tried time and agin, down on the Island, and allers failed. Ben Miller had jest sich a consarn, and tinkered away with it four or five years, and gin it up as a humbug."

"Yes," said I, "and Ben Miller tinkered with fish, and spiled his land, you said, but you see what whopping crops I get with fish, eighty bushels of corn to the acre, and forty of rye. You see, Jotham Sparrowgrass, it was never meant that one man should do everything."

"It is well Mr Bunker has the money to lose on such an experiment," remarked Mr Spooner, who evidently had as little faith in my success as our less intelligent neighbours.

Well, last year I got a good crop, but there was a considerable seed left, and occasional weeds. This year spoiled the beauty of the place. Last year the Timothy and the Sparrowgrass sowed two years ago got a good crop, and a handsomer lot of grass than I ever saw out of doors. It was a grand sight on the morning when we cut it, the purple tassels of the Timothy standing just about four feet high, and the cocksfoot a

little shorter, a thick mat of heavy grass, in many places good for $3\frac{1}{2}$ tons to the acre. I tried to get my neighbours all out to see it, but it was hard work to get some of the sceptics along the road anywhere in sight of it, they were so determined that nothing but salt marsh grass should grow there for ever.

I suppose I have ruined myself for life in the esteem of Deacon Little, who, having seen the hay, and heard the talk of the people, thinks I must have had resort to the black art to get the crop. The Deacon is about half right, for I did give about 2 acres of it a thorough top-dressing of black compost last winter, which started the grass as if there was something behind it. This is the only kind of black art I believe in, and this I am bound to practice and teach to my neighbours. I think it is not very dangerous.—Yours to command,

TIMOTHY BUNKER, ESQ.

NO. XXXIII.—TIM BUNKER ON THE SHADTOWN PARSONAGE—AND A GRANDSON.

MR EDITOR,—I told you at the time we fixed Sally out for housekeeping that I should probably have something to say about the young folks after the wedding, when the writers of stories generally say good-bye to their heroes. I did not think then that I should have anything special to say so soon; but this is a fast age of the world, and any writer who keeps up with the times will not have a chance for his ink to get dry in his quill.

Mrs Bunker and I were sent for last week, to come down to Shadtown and make a visit, not thinking at all what honours awaited us. Shadtown lies on the river, a few miles from here, and is one of those homely names that stick to a place for ever. They have a good many such names up thereabouts, and the folks, or at least a part of them, seem to glory in them, as if they were the right things in the right place. They were suggested by the character of the country, or by some incident in their early history, and the necessity of a change has never been felt. Break-neck Hill took its name from its dangerous character, and from the fact that a man was once thrown

from his horse, and killed there. Hard-Scrabble is a very poor, rough region, and both men and animals have to scramble to get a living. Bean Hill was so called from the fact that that esculent grew in great perfection in the vicinity, and was greatly delighted in by the inhabitants. It was the invariable Sunday dinner accompaniment the year round, and, to ministers even, was a reliable indication of the day. Tradition relates that the Deacon was once sadly misled by the failure of his usual dish, the bean bag having been exhausted unexpectedly. He had already ground his scythe, and would have gone to mowing but for the timely remonstrance of his good wife. This may have been a scandal, but the bean-eating is still kept up by the people in all its early vigour.

They undertook to alter the name of the place some years ago, and call it Myrtleville, but they could not make it go. The old inhabitants said that "beans grew there, and myrtles did not ; and they could not see the use of putting a name to a place that did not belong to it." Bean Hill they could see the reason of, for everybody in the place ate baked beans, and the crop was natural to the soil.

Shadtown is a staid parish, and the people boast that they have never quarrelled with their minister. A few have filled up their half century of service, and all have died among them. They are about as proud of this as they are of the name of their place. Shadtown was the name given by an old minister, is honourable, and is therefore to be honoured and had in reverence for all coming time. The man that should propose to change it to Tivoli, Arno, or any other euphonious name, would be mobbed, if that thing were possible in this part of the country.

At the time Josiah was settled here, a couple of years ago, the people made a stir, and built a new parsonage. The old building had stood over a hundred years, and had accommodated their last three ministers.

The new parsonage was built a little nearer to the church, setting it back farther from the road, and throwing a part of the fruit trees into the side garden. The house was every

way convenient, and contained all the fittings that a woman needs to keep house easy with. In front of the parsonage was a beautiful lawn, nearly an acre, nicely fenced, and planted with evergreens and shrubs, so that it looked about as inviting as any house in the village.

It was curious to see what a great variety of fruits had been planted in the garden and orchard by the good men who had lived and died upon this spot. There is about an acre devoted to apples, and some of the trees, I guess, are a hundred years old, for they have been old trees ever since I can remember. Then there are perhaps twenty old pear trees, and a good many younger ones, just beginning to bear, to say nothing of the dwarfs that Josiah has just put out. All the small fruits, currants, gooseberries, strawberries, and raspberries, have their appropriate place. Grape vines run along the sides of the barn, and on arbours built on purpose for them. Plums seem to flourish here, the soil being a little clayey. The peaches have declined, though there are the remains of famous trees, at least forty years old. There are cherries and quinces in abundance, and along under the wall, celery and asparagus enough to stock the neighbourhood.

I learned from Josiah that his predecessors had been in the habit of doing this, the parsonage garden being a sort of free nursery for the parish. Seeds of flowers and vegetables, and grafts and young plants of the smaller fruits, were freely distributed every spring, so that almost every garden in the parish had its mementos from the parsonage. It was a literal sowing of good seed on good ground, for it almost always bore fruit to the minister's advantage, as well as to the people's. The whole region is noted for its good fruit, mainly originating from the parsonage. The finest peaches I have ever seen in any of the markets came from Shadtown. The parish has always been remarkable for its peaceful character, and for its religious prosperity. The unselfish example of the minister seemed to be contagious, and there was a "provoking to love and good works," not always manifest among good people. The minister took an

interest in the bodies of his people as well as their souls, and diligently looked after their temporal prosperity. All appreciated these labours, and somehow, what he said on Sunday struck in all the deeper for what he did on week days. The children might not understand his theology, but they did understand his strawberries, and thought that the doctrines that kept such company were good enough for them. The hardest points in the Catechism were taken on faith, and Shadtown has always been as orthodox as it has been peaceable and united.

Now, I am not much of a philosopher, but I guess the characters of the past ministers, being lovers of good fruit, as well as of good men, have had something to do with the prosperity of the parish. Their theology grew where their fruit did, in the open air and sunshine; and I guess light and air are about as necessary for sermons as they are for strawberries. Bad digestion makes a man's thoughts about as sour as his stomach, and the acidity of the pulpit often leavens the whole parish.

The folks in Shadtown say that Josiah is walking in the footsteps of his predecessors, only a little more so, that he gets all the new pears and strawberries, and as soon as he finds they are worth cultivating, he sends them out to his neighbours. I found John's milking stools had come into play, and the butter and cheese which Sally had made with her own hands, were about equal to anything we have in Hookertown. Mrs Bunker says, that she will have to own beat on housekeeping and butter-making, but it is much safer for her to say that than it would be for anybody else—in her hearing. She was very much pleased with her visit, but most pleased with her first grandson, whom they have named "Timothy Bunker Slocum." Whether he is a child or its name, made her absent-minded, I am unable to say, but I noticed his spectacles on, wrong side up, twice in one morning, and that the knitting was entirely forgotten—Yours to command,

TIMOTHY BUNKER ESQ.

NO. XXXIV.—LETTER TO SQUARE BUNKER
FROM HIS NEIGHBOURS.

TO TIMOTHY BUNKER, ESQ.,—You are getting people all by the hair up here in Hookertown, which don't look well in a Justice. Them personalities must be stopped, for we shall have to put a stopper on you being Justice of the pease, enny mower.

There is tew sides to all questions, and as many as tew to that *mash*. If taint a humbug, it's a grate hobby, and is bound to run itself strate intu the ground. Then, we guess, somebody else will be riting funny things in the papers abeout their naburs, beside Square Bunker. One of 'em, a district committee man, who knows all abeout skools, sez, that he never knew a mash yet that didnt turn Injun, and he guesses Square Bunker cant work mirakles, to keep his'n from 'postatising. He sez, that you've spent a deal of money, and its nothing but money that makes this mare go, as in other kases. Bimebye the tide gate will get broke, the ditches will fill up, the clover will die eout, and reeds begin to grow again—and some fine morning you'll be looking for that mash, and find it under water.

Jake Frink sez that crabs and salt water tadpoles will be swimming all over it arter a little while. Jake feels as kross as Tophet at being called nick-names, and we guess he ain't the only ones nuther. His son Hezekiah, that you have blackguarded so much, is gwine to marry a spectable widder, and he don't want to be nick-named enny mower.

There's tew of your naburs, at least, who take the paper, that want this business stopped. When we enquire abeout tide gates, or enny sich like konsarns, we don't want to be maid fun of, and shant. How would you like it yer self, Square Bunker, to have your naburs twit you abeout them long-legged boots, or that old hat, that come deown from Noah's ark, and them other klothes, that aint exactly the rig for a Justice; or abeout Kier Frink's beating you at shooting wood pigeons, and he has done it menny a time. Don't you kno' yer self, that twitting on facts riles up people dreddfully, and is like fire and brim-

stone on the raw flesh? Neow, ye see, Square, folks as lives in glass houses should not throw stuns. We jest want to let you kno that we've got stuns to throw, and shall sartintly throw 'em if you don't stop them personalities. — Very detarminedly, your naburs,

HORATIO NELSON TUCKER.
ARTHUR WELLINGTON JONES.

NO. XXXV.—TIM BUNKER IN REPLY TO HIS
NEIGHBOURS' LETTER.

MR EDITOR,—I was considerably astonished to see the letter from Tucker and Jones in your last paper. I did not suppose that I had said anything to break the peace, or to stir up my neighbours, and even that letter don't fairly convince me. You see it is a great country, where it takes two folks to write a letter—and such a letter! Anybody that knows those two men knows that they did not write that letter. It is not in them, and what is not in a man can't come out of him any way. I took the paper right to Tucker, as soon as it come, and says I to him, says I,—

“Tucker, do you know who wrote that letter?”

“No, I don't, Square,” says he, “blam'd if I do.”

And neighbour Jones said the same thing. If they told a whopper, it probably is not the first one they have told, for though I say it, that should not, their reputation don't stand any the highest for speaking the truth.

I suspect they either got somebody to write the letter for them, or some envious person, who wants to get hold of my piece of reclaimed marsh, wrote it in their name, meaning to run it down, so as to get it as cheap as possible. That is about the drift of the letter, as far as I can see any in it. But I may as well say, first as last, that that piece of land is not in the market. Land that will cut three ton of hay to the acre, or pasture a cow through the whole season, is about good enough to keep. The marsh has turned the heads of some people, and I have had a lot of folks from a distance to see it, and to learn how the trick was done. A fellow called the other day who

had a project in his head to reclaim 3000 acres, and make a mint of money out of it. It can be done just as easy as to toss a sixpence, if he has the money to do it with.

That letter tried to make it out that I had spent a great deal of money on my marsh. This shews how little the writer knows about it. I have got more than muck enough out of the ditches to pay for all the improvements and top-dressings applied to it; so that I am a good deal in debt to that land to-day. The principal part of the expense of such an improvement is in the embankment, and that was all made in this case.

As to this marsh ever going back again, of course it will, if it is not taken care of. Any fool can see that if the tide-gate is not kept in order, the sea-water will come in, and the salt grasses will grow again. But any fool in Hookertown will tell you that Tim Bunker knows enough to keep a tide-gate in order, and to shut out “crabs” and “reeds.”

The letter tries to make a handle out of my *dress*, and on this subject I guess I am posted about as well as some of my neighbours. I believe in people dressing according to their characters and their business. If there is anything better than indiarubber boots for a ditch half-full of water, I should like to see it. I have not got above my business of farming yet, and don't expect to very soon. Some folks, I suppose, like Tucker and Jones, if they should be made a Justice, or elected to any high office, would not wear anything but calf-skin for the rest of their lives; and thereby, I think, they would shew that the calf was a little more than skin deep.

You see, Mr Editor, this matter of dress is of more importance than most people think. It makes or ruins a multitude of people, and has a great deal to do with these crashes that you have in the city, every few years; and to begin with, as Mr Spooner would say, there is a great deal in dressing folks up with the right kind of names when they start in life. I don't think your correspondents were as lucky in their names as they might have been. Horatio Nelson Tucker and Arthur Wellington Jones sound considerable grand and uppish, as if a man would have to stoop some

when he came into the room where such people lived. But I guess if you knew the folks that wear them as well as I do, you would not think there was much call for manners. You see, Tucker's father was never worth a sixpence in the world, above the clothes he had on his back, and his mother had more pretensions than any woman of her size I ever knew. He was a tailor by trade, and spent all his earnings upon broadcloth and silk for himself and wife. I remember when silk and lace parasols first came round, Tucker got one for his wife, and she was so anxious to shew it, that she carried it to church with her, and hoisted it in church time, just as Mr Spooner begun his sermon, as much as to say, "Tucker's wife is somebody arter all." The way the minister looked at her was a caution to all peacocks, dogs, and other vermin. Deacon Smith had to come over and tell her to take down that windmill, for he hadn't seen one before, and he did not know what to call it. Mrs Bunker said, "She thought she would have sunk into the earth."

Well, you see, when their first child was born, thinking, I suppose, that they would not have much else to give, they gave him the name of Horatio Nelson Tucker. Now, what's the use of dressing up a poor boy with such a big sounding name? You see, it makes too heavy a load for an ordinary mortal to carry through life. If he ever makes anything, becomes a business man, it is a great waste of paper and ink to have to write so long a name. And if he don't make anything, he becomes a standing joke like the present Horatio Nelson Tucker. He has always lived in lodgings, and worked from hand to mouth, when he worked any. To tell the plain truth, he has never hurt himself with work of any kind, and though a farmer, has been about as shy of the dirt as his father was before him. I suppose it's wicked, but I never see him in church without thinking of that parasol forty years ago. The green of that silk went as straight into that boy as if he had grown on a mulberry tree, instead of being born like other mortals.

Jones came of a better family. His father, Jones, was flourishing forty years ago.

He had a good deal of money left him by his father, and married rich. The General was mighty fond of cocked hats, epaulets, and other military finery, and his wife was fond of French fashions and extravagant dress. They used to drive through the street in Hooker-town in a splendid carriage, drawn by a pair of black horses, with harness glittering with silver buckles and mountings. Nobody held their heads higher than the Joneses of the last generation. The General's house was crowded with gay company from the city, his wife and daughters dressed splendidly, and gave brilliant parties, where the wine flowed like water, and the dance and song lasted till morning.

The Gen'l died a bankrupt when the present Arthur Wellington Jones was a boy of ten. Of course the property had to be sold, and Arthur had to go to work for a living, which was the best thing that ever happened to him, or any other man, according to my notion. He, however, had got some high notions in his childhood, that have prevented him from succeeding in life. He has never loved work, like one who has grubbed in the dirt from the time he could grasp a hoe handle. You must begin early with the boys, if you want to make them love work. Rub their noses in it as soon as they can run, and they will always love the smell of mother earth as long as they live. But if you dress them in fine clothes until they are ten and twelve, and then try to break them in, it is just like breaking in a six-year-old horse—mighty hard work.

To state the case just as it is, Arthur Wellington Jones is too much afraid of dirtying his clothes to get along in life. And these are the kind of folks, you see, that are laughing at Tim Bunker's old hat and long-legged boots, and talking of throwing stones because I live in a glass house. They have the advantage of me in flinging stones, for they haven't got any houses at all, of their own, if I should want to throw back again. My hat is old, as they say, but it is paid for, which is more than can be said of the hats of my illustrious neighbours, Horatio Nelson Tucker and Arthur Wellington Jones.—Yours to command,
TIMOTHY BUNKER, ESQ.

Our Library Table.

Facts and Dates on the Leading Events in Sacred and Profane History, and the principal Facts in the various Physical Sciences. By the Rev. ALEXANDER MACKAY, LL.D. Edinburgh: W. Blackwood & Sons.

THIS volume is at once the most complete, concise, and accurate manual of dates which has been published; its classification, too, is excellent. The book is in two Divisions—1, comprising Scientific Facts, and 2, Historical Facts. Division 1. is in seven chapters, as follows:—Astronomy, Chemistry, Natural Philosophy, Botany, Zoology, Ethnography, and Geology. The second Division is in two parts, devoted to Sacred History and Profane History. The first is in three chapters, comprising Old Testament History, New Testament History, and Ecclesiastical History. The Division of Profane History is sub-divided into Antient, Mediæval, and Modern History; and nine chapters are devoted to this. As a useful work for the student, we know of no single volume to equal it in its mass of facts and references to dates. Here, however, our praise must stop; for, if we look to the expressed aim of the little volume we have very little to say in its favour. The professed object of Dr Mackay is to impress on the mind of the student all the facts and dates accumulated in this vast storehouse, by a system of mnemonics, somewhat on the plan of Dr Peck, who, a few years since, obtained some celebrity as a lecturer.

Dr Mackay's system of impressing numbers and dates on the student's mind is by using the *consonants* of the English alphabet to express numbers, the *vowels* being disregarded, the semi-vowels (*w y*) and *x* being used to denote the cypher (0). The following is the arrangement:—

1 is expressed by	<i>b c</i>	6 is expressed by	<i>m n</i>
2 " "	<i>d f</i>	7 " "	<i>p q z</i>
3 " "	<i>g h</i>	8 " "	<i>r</i>
4 " "	<i>j k s</i>	9 " "	<i>t v</i>
5 " "	<i>l</i>	0 " "	<i>w x y</i>

When we wish to remember any particular date, or any fact in science, we have to form a short sentence, bearing on the fact or event, in such a way that the first *consonant* of the several words shall express the figures we wish to remember. For instance, suppose we desire to recollect the year when Queen Victoria began to reign, we must impress on our memory a sentence somewhat like the following:—

"Began to Reign our Gracious Queen."

Turning to the above table, we find, taking the first consonants of each word, that

B stands for 1
R " 8
G " 3
Q " 7—or 1837

It must be kept in view that conjunctions, prepositions, and pronouns do not count. Dr Mackay in connexion with every date in his book gives what he considers an appropriate sentence, bearing some relation to the fact required to be remembered; but it becomes a question whether it is easier to learn one thousand dates or one thousand arbitrary sentences, which are expected to call the date to memory. For instance, the date of the colonization of New Zealand is required, and Dr Mackay gives us

Coal, Iron, Silver, and Wool = 1840.

The Income-tax passed, is expressed by

Act to Repeal Sundry Duties = 1842.

War with Mexico,

Colossal Republic Succeeds to a Legacy = 1845.

Marriage of Prince of Wales,

British Realm Unanimously Agree = 1863.

Irish Church disestablished,

Churches in Ireland Now on Trial = 1869.

And so on.

Had Dr Mackay given us nothing but his Facts and Dates, we should have thanked him; but the elaborate means he has employed to enable us to remember them does little except to encumber the volume. It is but another instance of misapplied labour.

The Parks, Open Spaces, and Thoroughfares of London.

By ALEXANDER MACKENZIE. Waterlow & Sons, London, 1869.

THIS small and inexpensive pamphlet, by the superintendent of the Alexandra Park, Muswell Hill, London, is not only deserving of careful perusal at the hands of those who are intrusted with the management of the parks, open spaces, and thoroughfares of the British metropolis, but of city and town rulers generally; for many of the strictures and remarks it contains are of general importance, although, in the first place, specially applied. It appears that the public parks of London extend over 2000 acres, exclusive of the enclosed spaces, commons, &c., all of

which, according to the writer, "are more or less cared for, and upon the maintenance of which large sums of money are spent annually, and in some cases with bad effect." Such as Hyde Park, of which he says, that the attempts at landscape and ornamental gardening lately made in it, it is impossible to speak in language too severe. . . . The threatened withdrawal by the present Government of the annual sum expended of late years in providing bedding-out plants for the London parks, has drawn public attention to a subject which our author characterises as an extravagant system of attempting to convert those parks into sub-tropical gardens, with luxuriant parterres of flowers, which cannot be too severely condemned; as neither the climate nor the soil are such as to do justice to them. For this sweeping condemnation, the doings in the London parks of late years have, it must be admitted, given some cause; but we are glad to see it in some measure qualified by a succeeding remark that, "in all public parks there should be some spots dedicated to Flora; but, whilst these should be excellently kept, it is only necessary that they should be of moderate extent. At present, upwards of 100,000 plants are annually bedded out in Hyde Park alone." This, many will be inclined to look upon as no excessive number after all, as private establishments can be instanced in which it is largely exceeded. But even in these, and more especially in the parks of cities and towns which are only fully inhabited during the winter and spring months, we certainly should like to see less attention bestowed upon bedding-out plants for summer and autumn display, and much more devoted to furnishing such grounds with evergreens, early blowing bulbs, and others that are capable of producing an effective display in winter and spring.

Some recent attempts at Metropolitan Landscape Gardening are commented upon with not less severity than the Flower Gardening; when, instead of symmetry, ease, breadth, and repose, ostentatious mounds have been formed with the greatest regularity, amounting, in fact, to monotony, "but they resemble nothing so much as shapes turned out of huge pie-dishes, with a specimen tree or shrub stuck in the centre of each." This is a too correct description of every day perpetrated urban gardening, arising from the fact that city rulers are themselves generally devoid of the requisite taste and knowledge, too self-sufficient to admit

and too short-sighted to see that a little outlay for proper professional advice will prevent much further obliquity and cost.

In regard to the disused London burial-grounds, we have no hesitation in siding with those who have too much regard for the sanctity of the grave, to acquiesce in utilizing them as places of resort for recreation. Nor can we agree in the recommendation, that while only a few really important historical monuments should not be interfered with, and a number of others might be retained in deference to the feelings of survivors, or as objects of curiosity and interest. The remainder should be removed, laid flat and covered over, or arranged against the surrounding walls, to allow of considerable portions of the ground being reclaimed, and rendered attractive for public resort.

It is satisfactory to learn that the Metropolitan Board of Works are not inattentive to the necessity of timely providing for new parks and open spaces, as the rapid extension of the city progresses; and although all that might be has not been done by them in this respect, yet they have shewn a good example to other city authorities, which these would do well to improve upon. Take, for example, the Scottish metropolis, which has long been famous for the extent, beauty, and variety of its public parks and pleasure-grounds, that are at all times open—associated, it may be, with a little grumbling arising from the too exclusive appropriation of others. Like many other cities, it has been very much extended of late years, chiefly southward, westward, and northward, but without adequate provision being made in either of those directions for public parks or recreation-grounds. This neglect is the less excusable, seeing that these grounds, if judiciously chosen, would enhance the value of the near surrounding and more distant building land, to such an extent as would in a great measure compensate for its being thus appropriated. In a former volume we pointed out the urgent necessity for the formation of a public park on the north side of Edinburgh, adjoining the Royal Botanic Gardens; and also of securing, ere it be too late, a stretch of coast ground along the shores of the Firth of Forth at and westward from Granton, Harbour, to which subjects we may again return. In conclusion, we recommend a careful perusal of the book under notice to all who are interested in city improvements.

The Garden.

HISTORY OF FLORAL DECORATIVE PLANTS.

IN pursuance of this subject, we furnish the following remarks on the Hyacinth, for which we are indebted to Mr William Paul, of the Nurseries, Waltham Cross, one of the best growers of Hyacinths in this country. Some account of the different sections of Pelargonium was promised first; but we select the Hyacinth as being more seasonable, leaving the Pelargonium to be dealt with hereafter:—

The Hyacinth (*Hyacinthus Orientalis*) is a native of the Levant, whence it was introduced to England in 1596. In our climate, if planted in November, and left permanently in the ground, the flower stems and leaves rise in March and decay in June, the bulb again remaining hidden in the ground till the following spring. Although it is customary to remove the bulbs from the ground when the leaves decay, and store them in some cool dry place, there to remain till replanted in the autumn, this practice is not absolutely necessary. It is doubtless desirable, when, as is often the case, the beds are afterwards planted with bedding plants; but if the ground is to rest without a crop, or is merely sown over with annuals, the bulbs may safely remain permanently in the ground.

It has been said that the Hyacinth was introduced from the Levant in 1596; but it was known to Dioscorides, who wrote about the time of Vespasian. Gerarde, in his "Herbal," published at the close of the sixteenth century, enumerates four varieties—the single and double blue, the purple, and the violet. In that valuable old book on Gardening, "Paradisi in Sole Paradisus Terrestris," published by Parkinson in 1629, there are mentioned and described eight different varieties. Some, he tells us, are pure white, another is almost white, but having a show of blueness,

especially at the brims and bottoms of the flowers; others, again, are of a very faint blush; some are of as deep a purple as a violet; others of a purple tending to redness; and some of a paler purple. Some, again, are of a fair blue, others more watchet, and some so pale a blue as if it were more white than blue. After the flowers are past, there rise up great three-square heads, bearing round black seed, great and shining. So wrote Parkinson in 1629.

Here, then, is the type of those splendid eastern flowers which decorate our halls, our conservatories, our parterres, with their gay and varied colours, and load the air with their delicious perfumes at a time when winter still lingers upon our northern shores. It is interesting to compare the Hyacinths of that period (1629) with those of the present time, and to mark the improvement. Nearly two centuries and a-half have elapsed since then, and this simple flower serves well to illustrate the great fact, that the original forms of nature do not remain fixed and stationary, at least when brought under cultivation. While looking at the extremes, we must not, however, forget that there are intermediate stages which are for the most part lost to us. Nature will sometimes indulge herself with a leap; but, as a rule, her march is slow and gradual.

The Horticulturist, once in possession of the wild forms of plants, finds it to be his business to cultivate and improve them. In order to accomplish this, he has in his mind an ideal of beauty, for the realization of which he works with head and hand; but this ideal is not fixed and unalterable; it is, in fact, constantly exalted with our own advancement in intelligence and experience. Shew us one of the most beautiful of flowers, and we will

presently conceive one still more beautiful. The ideal of to-day, when realized, leads to a higher standard in the future.

Among the numerous varieties of Hyacinth at present in cultivation are found not only various shades of colour, but also flowers and spikes of different forms and proportions. Without presuming to define the exact height or breadth to which a good Hyacinth should be restricted, it may be stated that 6 inches in length, and 8 inches in circumference, in reference to that part of the spike which is covered with flowers, are symmetrical and pleasing proportions. Such spikes afford unmistakeable indications of progression. The flowers, originally narrow, wrinkled, and pointed, are now broad, smooth, and round; the breadth and length of the spike, and the size of the individual flowers, are increased, and the colours are intensified. By the increase in size the plant has become more highly decorative, while the broader, smoother, and rounder petals give finish and brilliancy to the whole. But let us put these views in a more exact form:—

The original spike was short and narrow.

The improved spike is long and broad.

The original spike was feeble, drooping, and loose.

The improved spike is strong, erect, and compact.

The original form of the flower was square, or polygonal, and crumpled.

The improved form of the flower is round, or almost round, and smooth.

The original substance was flimsy and transient.

The improved substance is solid and durable.

The original colours were few, undecided, and dull.

The improved colours are many, decided, and clear.

These changes, then, are the work of the Horticulturist, who, we think few will deny, has reason to rejoice over the fruits of his labour. In the progress of which we have spoken, we find evidence which we cannot ignore, that Horticulture, viewed either as an art or a science, is capable of infinite

extension and improvement. In advocating, however, increased floral development by, as it would seem, artificial means, there is no wish to depreciate the works of Nature herself. We may admire the simple beauty of flowers in a wild state; we may wonder at their adaptability to the situations which they naturally affect; we may have revelled amid their pleasant and fascinating associations; but we must remember that, as Horticulturists, we are looking at the question in a Horticultural point of view.

But let us turn to the culture of this flower in our own country. Here the subject seems to fall naturally under two heads—out-door and in-door culture. When grown out of doors, the bulbs should be put in the ground late in October, or early in November. The crown of the bulb should be placed 4 inches below the surface of the soil, and 2 or 3 inches of litter should be strewed thereon as a protection against frost. The litter may be removed early in spring, at least as soon as the leaves have pushed fairly through the ground, but it should be replaced at night during frosty weather. As regards soil, a sandy loam is that in which Hyacinths seem to grow and flower best. And if that is not the natural soil where they are intended to grow, it is well to provide it artificially. If during the season of flowering a slight shading be afforded, the quality and durability of the flowers will be increased. Hyacinths out of doors seldom require water, as the soil is sufficiently moist for them naturally. When the flowering is over, and the leaves shew signs of decay, the bulbs may be taken up and laid by for a fortnight, embedded in the surface soil, after which time they may be gathered up, deprived of their roots and leaves, and placed away in a cool dry shed or storehouse. This, as has already been stated, may, from varying circumstances, be desirable, but is not absolutely necessary.

The in-door culture of the Hyacinth in pots, rustic baskets, bowls, and glasses, is largely carried out in this country. Indeed, our conservatories and halls would be shorn of their brightest and sweetest floral embellishments in winter and early spring were

the Hyacinth and the Tulip withheld. Hyacinths potted in September may be brought into good condition of bloom before Christmas, and by potting fresh bulbs at intervals of a fortnight, till the end of the year, a succession of flowers may be obtained till the middle or end of April. The best soil for Hyacinths in pots is also sandy loam, enriched by cool and solid fertilizers—of these, decayed cow-dung is excellent. Guano favours full development, rather than that of flowers, at least experience points to that result. When placing the bulb in the pot, the crown or apex should be just above the soil. The pots should be placed on the level soil out of doors, and surrounded and covered over with a thick layer, say 6 inches of cinder ashes, as an efficient protection against frost. They should not be left more than two months in this position, by which time the leaves and flower spikes will be pushing forth. Then remove them to a cold pit greenhouse or forcing-house, according to the date at which they are wanted to flower. Deluge the soil with water, repeating the operation at intervals till the flowers are on the wane. Place the plants close to the glass, and admit abundance of air, in order that the leaves may not be developed out of proportion. Long leaves and attenuated stems are due to the want of air and light. It is, however, necessary to say that the Hyacinth, however skilfully grown, requires an artificial support for the flower stem, for which purpose a piece of wire bent zigzag answers perfectly. Hyacinths, under our system of cultivation, do not succeed a second year in pots or glasses, but if planted out of doors when taken from the pots or glasses, they become useful for flower-garden decoration.

The cultivation of Hyacinths in glasses is a delightful recreation, and is a branch of indoor gardening now very generally practised. Nothing is easier than to grow good Hyacinths in glasses, provided the cultivator possesses good sound bulbs. Size is not always evidence of quality. Weight furnishes a more reliable test. To know the conditions and method of previous culture are, however,

the most satisfactory means of arriving at correct conclusions on this head. That these points are worthy of attention will be apparent when we state that there is a difference of nearly 50 per cent. in the quality and marketable value of the bulbs annually imported.

Nothing can be more interesting than to watch the development of root, leaf, and flower, during the growth of Hyacinths in glasses, and therefore we shall conclude these observations with a few short simple observations on the subject:—

1. If you choose your own bulbs, look for weight as well as size; be sure, also, that the base of the bulb is sound.
2. Use the single kinds, only because they are earlier, hardier, and generally preferable for glasses.
3. Set the bulb in the glass, so that the lower end is almost, but not quite, in contact with the water.
4. Use rain or pond water.
5. Do not change the water, but keep a small lump of clear coal at the bottom of the glass.
6. Fill up the glasses with water, as the level sinks by the feeding of the roots, and by evaporation.
7. When the bulb is placed, put the glass in a cool dark cupboard, or in any place where light is excluded, there to remain for six weeks, as the roots feed more freely in the dark.
8. When the roots are freely developed, and the flower spike is pushing, which it will be in about six weeks, remove, by degrees, to full light and air.
9. The more light and air given, from the time the flowers shew colour, the shorter will be the leaves and spike, and the brighter the colours of the flowers.

Returning to the days of Parkinson, and following the stream of time, we find, by the writings of successive authors on Gardening, that the culture and improvement of the Hyacinth steadily advanced. In the seventeenth century, Holland contained the principal manufactories and storehouses of all

that was rare and beautiful in Horticulture. About the middle of the century just named, Dutch "Florimania" was at its highest; then as much as £200 was given for a single Hyacinth, and more than £600 for the *Semper Augustus Tulip*. Loudon observes that many noted instances are on record of the extravagant sums given for flowers possessing certain qualities agreed on by Florists as desiderata, and established about this time as canons of beauty. Hirschfield states that, in the Register of the City of Alkmaar, it is reported that, in the year 1637, there were sold publicly, for the benefit of the Orphan Hospital, 120 Tulips, with their offsets, for 9000 florins, and that one of those flowers, named the Viceroy, was sold for 4203 florins. When we consider the value of money at that period, these amounts appear enormous, a florin at that time in Holland being the representative of nearly an English bushel of wheat. In short, to such a height was this species of gambling carried, that the Legislature thought fit to interfere, and enacted that no Tulip or other flower-root should be sold for any sum exceeding about £50 sterling.

About the middle of the last century, Mr Rocque, then a florist at Walham Green, published a treatise on the Hyacinth, and about the same time Miller wrote some directions as to its growth in water. The fortunes realized by growing Hyacinths in Holland induced men of talent and capital to engage in it, and, as a consequence, from this period improvement went on rapidly. Miller tells us that, in the early part of the last century, the Haarlem florists distinguished two thousand sorts. Since that period the number of sorts has probably decreased rather than increased: it is true that new kinds come forth, but their number is few, and many of the old ones have disappeared before the more valuable quality and

fashion. In one of the most extensive bulb gardens at Haarlem there were found last year only seven hundred sorts, and probably not more than two hundred of these are in much demand.

The multiplication and growth of Hyacinths for sale is principally carried on out of doors in the vicinity of Haarlem. The sandy soil, and moisture both of soil and climate, in Holland is peculiarly favourable to the growth of the Hyacinth. In the month of June, when the bulbs are ripening, the ground temperature is greater than that in England at the same season. About Haarlem, hundreds of acres are devoted to the culture of Hyacinths and to her bulbous plants, and the gardens there, in consequence, present a gay sight from April until midsummer, and even later. The spring flowers are principally Crocuses, Hyacinths, and Tulips; those of summer, Ranunculuses, Anemones, Ixias, Irises, and others. Large warehouses are erected, with tables rising tier above tier on which the bulbs are laid to dry when taken from the ground in summer.

Hyacinths are propagated by means of seeds or offsets from the parent bulb. New varieties are obtained from seeds; offsets reproduce already known and valued kinds. The latter process takes place naturally, but by skilful manipulation the yield of young Hyacinths is greatly increased. The bulbs are cut crosswise, and sprinkled with sand to absorb any superfluous moisture that may exude from the incisions. After a time they are planted in the ground, when numerous small bulbs are formed on the cut edges. At the expiration of one season they are again lifted from the ground, and the numerous small bulbs, still only partially developed, are separated from the parent root and planted out again and again, year after year, for three or four years, before they become flowering bulbs of marketable quality.

CULTIVATION OF MUSHROOMS.

BY MESSRS SUTTON AND SONS, READING.

MUSHROOMS are grown artificially in hotbeds in different ways, and we proceed to indicate the means generally adopted, and the precautions necessary to be observed:—

1. The preparation of the manure destined to form the hotbed. 2. The formation and management of the bed.

1. PREPARATION OF THE MANURE.

A very important matter is this, and on its judicious management success entirely depends. Nearly all the failures to procure mushrooms arise from ignorance on this point. It may be performed in all seasons, but success is more certain in spring and autumn than at other times.

Take good horse manure, proportionate to the number of hotbeds required, giving preference to that from draught or working horses. Draw the fork through it to extract the long straw and hay, and take care to remove dirt or any other unsuitable substance.

Let the ground selected for forming the bed be smooth and fresh, and be protected from the incursions of poultry. On it deposit the manure in a heap 4 feet high. Length and width optional.

After well pressing or stamping, leave it level, but with a surface like the markings on a millstone. If in summer, and the weather be dry and hot, wet the heap abundantly; in the contrary case, do not water at all. The manure should neither be dry nor too moist. At the end of eight or ten days, when it has fermented briskly (which is known by the white colour of the interior, and is even noticeable on the surface), the whole heap should be turned and reconstructed on the same spot, taking care to place all the manure that was on the outside in the interior of the heap, together with any portion that may not have undergone equal fermentation. The bed must again remain eight or ten days,

at the end of which time it will have gained nearly as much heat as at first. Again, it must be turned as previously; and in about five or six days the manure acquires the degree of mildness requisite.

It is not always easy to judge when the proper condition has been reached, but it is essential, and this it is which makes practice almost indispensable; for on proper discernment at this stage rests the ultimate success of the bed.

When the manure has become odourless, is of a brownish colour, binds well, is soft, and on being pressed does not give out any water, then it may be considered good. If it will not bind, or is plashy and wet, it has not arrived at a suitable state. In the first instance, it must be moderately moistened and turned about, but in the second, the superabundance of humidity will in all probability have spoiled it, and it will be better to recommence.

(1.) One frequent cause of failure in the attempt to cultivate mushrooms arises from the very small quantity of manure used for the experiment. It may easily be imagined how much more difficult it is to obtain an equal fermentation in a very small bed, which is influenced on all sides by the atmosphere, than when a bed of considerable size is formed; it is therefore recommended that a larger quantity be prepared than would be required for the formation of the mushroom bed. The portion not used may be employed for ordinary purposes, without having undergone a perceptible deterioration in its fertilizing quality.

(2.) Mushroom spawn should always be in a dry condition *for conveyance* to ensure its preservation; but so used, it often happens that it takes root too slowly, allowing the bed in the meantime to become cool. To obviate this inconvenience, the spawn should be de-

posited four or five days before planting in some damp situation (in a cellar, for example), which will make it soft, and facilitate the vegetation; but care must be taken that it does not become mouldy.

2. THE FORMATION AND MANAGEMENT OF MUSHROOM BEDS.

The manure having reached a proper condition, the spawn should be introduced. In spring and summer the bed should be situated in the shade, in autumn and the beginning of winter a southern aspect, but in all seasons it is best in a cellar or other sheltered place, well closed in and darkened.

The size of the bed should be from 21 inches to 26 inches at the base, and the same measurement in height, finishing off span shape. The sides must be gently beaten with a spade to make them even and solid; afterwards the bed should be combed with a fork over the surface and on both sides, from top to bottom, so as to draw out any straw which might be too near the surface. Finally, spread over it some litter, which must always be kept dry, and in this condition the bed is left for several days; in summer, watering it from time to time with tepid water.

Littering down is only necessary for beds placed out of doors or in sheltered positions where light penetrates. Those made in perfect shade and darkness do not require it.

After a few days the bed will have reached a moderate degree of heat (70 deg. to 80 deg.), which can be ascertained by the insertion of the prob generally used for hotbeds.

The next process is dibbling or planting the spawn. That manufactured in England is made into the form of oblong square cakes or bricks, but that imported from France is in thin layers. The latter is the variety used by the market gardeners around Paris. Both kinds are impregnated with a whitish filament or felt-like substance, consisting of mushroom plant, and possessing the property of reviving after having been kept dry in a granary for several years.

The process of dibbling is performed with the hand, by making little oblique openings

about $2\frac{1}{2}$ inches in diameter, and of the same depth. Into each opening is introduced a piece of spawn.

If English spawn is used, each piece is about the size of a small hen's egg; but, if French, a flake of about the same diameter as the opening into which it is inserted is the proper quantity. The manure removed in making the hole is then restored and well pressed down. The openings are made equidistant, 9 inches apart, on two lines, the first commencing 3 inches from the base, and the second 5 to 6 inches above the first. The holes on the first line alternating with those on the second in a triangular pattern. This being done, the bed is again littered over, and at the end of a few days it must be examined to ascertain if the spawn has taken root, which will be known by the increase of white filament in the dibbling hole spreading itself in the bed. If not, the spawn, which has become black, is carefully withdrawn; and, in holes skilfully made by the side of the old ones, a new supply is immediately introduced, unless the bed may have become over-heated, in which case it is allowed to repose until it has returned to a suitable temperature, which should not decline below 75 deg. nor rise above 80 deg.

In gathering mushrooms, only a small space should be uncovered at a time. The gathering being finished, a little sifted earth must be placed over the spots from whence the mushrooms were removed, and the litter immediately restored. In dry seasons, after gathering, it is often useful to water moderately under the litter; but in wet seasons it is frequently needful to renew the litter, which may have become too much saturated with rain. The produce from one bed usually lasts from two to three months; but if in a cellar, it might last from four to five months.

If the spawn has taken well, it is allowed to remain six or eight days to permit of its penetrating to the top of the hotbed, when the latter is pressed firmly with the hands before earthing it. This operation consists in cover-

ing the entire bed with a layer of finely-sifted earth, about one-third of an inch thick, which is properly adjusted by lightly pressing it down with the back of a spade. The litter is then replaced and lightly watered, if the season requires it. The litter should never be taken off in any season, as its presence tends to keep the bed for a longer time in bearing. The most suitable temperature for beds in bearing is 50 deg. to 55 deg., and as a high temperature causes the mushrooms to come small, this should be avoided.

*THE PUBLIC NURSERIES OF PARIS.**

IT is a regular practice in this and other new public gardens in France to plant out a sample of their stock of tender flower-garden plants each year for comparison. In the parks, squares, &c., they of course have opportunities of seeing how they thrive, but the object is to test them all growing on the one spot and under the same conditions. Thus you see all the kinds of *Canna* planted out in one place, all the varieties of *Pelargonium* in another, and so on. It is a good practice, but it is needless to repeat it year after year to a large extent. If you have thirty species of *Solanum* planted out for several seasons in succession, you must know all that you want to know respecting their comparative value, and the practice here of planting out every year old kinds, time after time, is useless. All that is necessary is to test the new additions, and in some cases it may be desirable to plant the old ones by them for comparison, but to plant out annually a vast collection from a well-known family is quite unnecessary.

Large, light, and well-made spring vans are used for transporting the stock of flowers from the *Jardin Fleuriste* to the parks and gardens, and from one nursery to the other. They are about 12 feet long, and a little over 6 feet wide. By a simple arrangement, each van is made to do the work of two—a second floor of strong shutters, hinged two and two together, being placed at the height of a foot above the lower floor of the van. The shorter plants are stowed underneath, those

on the upper floor may be as tall as you like; but as the stock removed in this way usually consists of dwarf subjects, one serves as well as the other. By means of this plan, 2000 plants, each in single pots, are removed at a time. The contrivance is merely such as common sense would suggest; yet, for want of a little such common sense, how much labour is wasted! How frequently, for example, do we see in country places two men attached to a handbarrow dragging about plants! Of course, it is as unnecessary as it is laborious for the men. There is often more fuss and labour over transporting the summer flowers of a country place from the propagating houses to the flower-garden, than occurs with the several millions of plants furnished yearly by the city of Paris, and all for the want of a few simply-contrived spring barrows. Not to adopt simple facilities of this kind in our public gardens is sheer mismanagement.

There are also vans of peculiar make for conveying ornamental plants to the *Hôtel de Ville*. Those used in winter are furnished with a little stove with flat hot-water pipes passing round the interior, so that, while space is not curtailed, the van is efficiently heated, and tender plants can be conveyed by it in safety in the depth of winter.

Students of all nations are admitted to this establishment. They must be eighteen years of age, and must have spent some time in practical horticulture. Their pay is sixty francs per month during the first three months, seventy during the second, and after that, eighty or eighty-five francs per month; after

* From Mr Robinson's admirable work, "*The Parks, Promenades, and Gardens of Paris.*"

which they are paid according to capacity and intelligence. They are changed from section to section of the establishment, so as to study with profit each kind of culture. An extensive botanical library has lately been added for the use of the officers and students of this establishment, and is now being catalogued and arranged. It contains nearly all the standard English books on horticulture; indeed quite half the books are English.

Attached to the Jardin Fleuriste are a forge, a carpenter's shop, a glazier and painter's shop, stables, and other offices. These are, of course, indispensable where economy is necessary; and saving money is a consideration even for the city of Paris at present. The mode of glazing with several strips of lead-paper laid one over the other, as practised here, is too expensive to be recommended: it costs as much as the glass itself, and, after all, peels off after a time. It is known as the *couvre-joint métallique* of Celard, 16 Rue du Faubourg du Temple.

The Public Nurseries for Trees, Shrubs, and Hardy Flowers.—The nursery for trees for the boulevards is situated at Petit Bry, near Nogent-sur-Marne—a somewhat out-of-the-way place. The nearest railway station to the nursery is that of Nogent-sur-Marne, on the Strasbourg line. It consists of nearly 45 acres, entirely devoted to the raising of the commoner and more useful kinds of trees for avenue and boulevard planting. On entering it the first peculiarity that strikes the visitor is, that the whole of the surface of the ground is thrown into ridges nearly 6 feet in width, on the apex of which the trees are planted. This arrangement is adopted in consequence of the ground being occasionally flooded by the river Marne, which is close by, and the trees being injured by the water being frozen above the base of their stems. But the necessity of taking this precaution resulted in an advantage, as the trees, being planted on the apex of these ridges, and with the collar of each, say, a foot above the level, make their roots much nearer home, so to speak, and thus their transplanting is rendered much more easy. When the time comes for removing them the workmen begin at one end and

turn them out quite rapidly, all with close bundles of roots. The whole surface of the nursery is thus treated. The trees are a little more than a yard apart in the lines, which are, as may be inferred from what was before said, within a few inches of 6 feet from each other.

The kinds mostly used are the Western Plane, the Horse-chestnut, the large-leaved Elm, the *Ailantus glandulosa*, Planeras, and Lombardy poplars—the last, however, are not used for avenue or street planting. Other kinds used on a smaller scale than these—the Paulownia, for example—are grown at Longchamps. These trees, the names of which are put down in the order of their importance, are all trained straight, and sent from hence to the boulevards for planting, as far as possible of an equal size. The rule is to send them out with a clean stem nearly 10 feet high, and about 8 inches in circumference. The portion above the 10 feet of clear stem is not of so much consequence, and may vary; but if the trees, when taken up for planting, do not present the length of clean stem considered necessary, the lower branches are cut away till it is attained. Of course the trees are so pruned when young that straightness of stem is obtained. To arrive at the necessary size and fitness the Plane requires five years, the Horse-chestnut ten, the *Ailantus* four, the Elm and Planera about five years each. The Elm and Planera are the only trees that require support in training them into the necessary form, for which purpose stakes from 15 to 18 feet high are used. The whole place is surrounded by a hedge of *Tamarix tetrandra*, which is cut down occasionally, and the shoots sent to the Jardin Fleuriste for stakes for house plants and the like. This nursery is well kept and managed, and has a large stock of street trees.

The nursery for shrubs is very pleasantly situated near the racecourse of Longchamps, in the Bois de Boulogne, and is somewhat more than 12 acres in extent. I found it in excellent keeping, and with a good stock both of well-known and rarely used subjects. Roses and all kinds of shrubs and hardy climbers are grown here, as well as nearly every description of low tree. The superin-

tendent considered the Caucasian Laurel (*Cerasus Caucasius*) the hardiest and best of any he had tried. There were good stocks of those fine hardy *Aralias*—*spinosa* and *japonica*: they should be everywhere employed for the sake of their large and handsome leaves. A good many subjects were out for trial as to their hardiness, among them an extensive collection of Japanese plants. *Melia Azederach* was in a healthy condition after passing a sharp winter in the open air. From this nursery all the shrubs of the various parks, squares, and gardens of the town are supplied.

The nursery for herbaceous plants is situated in the Bois de Vincennes, and consists of nearly 20 acres of sandy ground, just outside the fortifications, near the Porte Picpus and Lac Daumesnil. There were here, at the time of my visit, 5 or 6 acres of *Chrysanthemums*, prepared for bedding in the various parks as soon as the frost had cleared them of their summer occupants. There were also large stocks of the flowers used to replace the *Chrysanthemum* and decorate the gardens in spring. The stock of spring flowers is an unvaried one, and leaves much to be desired. Where there is so much ground devoted to a specialty it ought to be well done; and it will be a pity if, with so much improvement in other ways, a large stock of all the really ornamental hardy flowers is not formed. The public gardens cannot fail to have a great influence on all visitors to Paris, and it would be conferring a very general benefit if, instead of depending so much on plants requiring expensive stoves and ceaseless trouble for their preservation, the chief gardeners of the city shewed what may be done with the hardy plants belonging to our own and similar climates. At present their collections of herbaceous plants and spring flowers consist

of quantities of common and not always first-class kinds. They have, for instance, very few *Tritomas* in the Vincennes Nursery, and none at all in the parks, though they are perhaps the most useful and attractive of all autumn flowers. It is, however, only fair to state that the nursery stock was killed in the winter of 1867. But when groups of these plants are established in the parks or gardens there should be little difficulty in preserving them by placing leaves over the roots in winter.

The nursery for the Pines and *Rhododendrons* is also in the Bois de Boulogne, near Auteuil, occupying somewhere about the same space as the one previously described. The climate of Paris is not so favourable to the growth of coniferous trees as that of England, and consequently to the English visitor the Auteuil garden does not look so attractive as that at Longchamps, but it is well stocked, and serves its purpose admirably. The American plants are mostly grown in the slight shade afforded by thin hedges of *Arbor Vitæ*. The ivy used for making the edgings, which are so much admired in Paris gardens, and for every other purpose for which the plant is employed, is grown here. Cuttings are first put in in handfuls, so close that the stems touch each other. After a year or so they are transferred singly into 4 or 6 inch pots, and plunged below the rims into the sandy soil. They are used for forming the edgings at the age of two or three years. Galvanized wire is extensively used here for the purpose of supporting plants that are usually staked. Stretched tightly in parallel lines, at about the height the line of plants requires, it forms a neater, handier, and cheaper support than ordinary wooden stakes, which are so liable to decay and shake about.

The Stable.

LAMENESS IN HORSES.

THE operation of neurotomy (says a correspondent of the *Field*) should never be performed for the relief of lameness depending on acute disease, because the disease is not removed by the act of cutting off the communication between the affected organ and the brain, and irreparable injury often follows the operation in such cases, in consequence of the immediate use by the animal of those diseased structures, rendered insensitive, and thus deprived of the protection which previously secured them from undue exercise. Even in cases of sub-acute inflammation of the vascular membrane of the internal foot, the disease is much increased after division of the nerves, although the horse may be still kept at rest in the stable, and in all respects be treated as he was before being subjected to the operation. The mere act of allowing the weight of the body to be thrown, to a greater extent than before, upon the inflamed organs is sufficient to cause an accession of disease.

The first thing to be insisted on in respect of an animal which it is proposed to unnerve is the absence of all signs of inflammation. Unless the feet are perfectly cool, it is quite certain that division of the nerves will increase the mischief instead of remedying it. Undoubtedly, the most successful cases are those in which the lameness is the result of confirmed navicular disease. If the veterinary surgeon could always select his cases, he would choose a horse with moderate action, a regular stepper, but a steady goer—with small, strong feet, and perfectly clean, not spreading hoofs, with large frogs, and with soft tendons, are decided disqualifications, and their objectionable character is materially augmented if the horse is in the habit of knocking his feet about in his

work. Some animals go as if they had made up their minds to seriously damage the roads on their way, while others touch the ground as if they respected it. The latter class will always furnish the most favourable cases for neurotomy.

Again, the kind of work for which a horse is required will materially influence the owner in deciding for or against division of nerves. An animal that promises to be of much use for slow work would perhaps scarcely be worth the trial, if he is to be employed as a carriage horse in a hilly country.

Saddle horses are almost excluded from the list of proper cases; although some men do not scruple to ride unnerved horses on the road and in the field, the proceeding borders on the reckless. The operation of unnerving cannot be recommended either in the case of a hunter or a hack. However good the horse may be, the loss of the sense of touch in the feet must prevent him from exercising the faculty, which he should possess, of discriminating the character of the ground over which he passes, and thus render him unsafe for riding, or even for driving, unless in a four-wheeled vehicle. The most favourable cases for unnerving are to be selected from among animals which are employed in light draught work. Very heavy cart horses are bad subjects, and fast goers are still worse. Having decided that the operation of dividing the nerve shall be performed, the next thing is to determine whether the section shall take place above or below the fetlock joint. In the first case, the nerve will be cut before it divides into two branches, and the loss of sensation in the foot will be complete; in the second case, one branch only of the nerve, the one which supplies the posterior part of the foot particularly, will be cut, and sensation

will still be left intact in the anterior part of the organ. There can be no question of the advantage of the modified operation as far as the functions of the foot are concerned; but there is considerable doubt of its efficacy in the treatment of chronic foot lameness. The late Mr Turner was in the habit of dividing the nerve on the outside of the leg above the fetlock, and that on the inside below the joint. This method left a small amount of sensibility to the anterior part of the foot, particularly the inside quarter, and many of his patients worked well for years. One particular horse, we recollect, was driven in a phaeton in London for four years after the operation, which was performed on both legs; and the animal failing somewhat at the end of that time, the inside nerves were divided above the fetlock with complete success; soundness was restored, and the horse worked on for several years longer.

In many instances, however, the low operation fails to afford relief for any length of time; and although some practitioners systematically adopt it, and speak strongly in its favour, the majority prefer the high operation as the more certain, notwithstanding the greater degree of risk with which it is attended.

A very considerable part of the success which is obtained in the treatment of foot lameness by division of the nerves, either above or below the fetlock, depends upon the care which is exercised at the time of, and subsequently to, the operation. A horse's foot, after the sentient nerves are cut, is an insensible mass, which may be pricked by the shoeing smith, injured by stones, or destroyed by disease, without the animal being aware of the changes which are going on. Consequently great attention is necessary to avoid puncturing the foot in shoeing; and, after a journey, extra care is required in washing the feet, and removing all foreign bodies which may have collected under the shoe, and a

trifling injury to any part of the frog or sole must be watched until it has perfectly healed. Ordinary diseases of the feet, as corns or thrushes, acquire a new importance in the unnerved horse, in consequence of the risk which exists of their going on to a serious extent without the animal indicating their presence by his action. Giving way of the flexor tendon below the fetlock joint is a very common result of the operation of unnerving, and most probably depends upon the sudden inordinate stress which is imposed upon parts that have been kept in a comparatively inactive condition for a long time previously. The first sign of this accident is swelling at the back of the leg, in the hollow of the heel; the part becomes knotted, and ultimately bulges out in a very unsightly manner; the animal goes upon the heels, and the toe turns upwards. The only remedy is a thick-heeled shoe, with rest, and cold-water applications to the part; but practically, the condition is seldom noticed until it has advanced too far to admit of beneficial treatment.

Altogether, the operation of unnerving, although in many respects a great triumph of surgery, must be looked upon in veterinary practice as a last resource, only to be adopted in cases which are otherwise of a hopeless character. When a good horse is so lame as to be quite useless, and all ordinary means of treatment have been tried in vain, the nerves may be divided as a preferable alternative to sending the animal at once to the kennels. The treatment is of the nature of a speculation; and if all the statistics could be obtained, it would probably be found that the successful cases are comparatively few. They would be more numerous, perhaps, than the failures, if proper care were exercised in the selection of fit subjects. The reckless use of the operation is to be deprecated, as calculated to bring a very valuable means of relieving animal suffering into disrepute.

ANTIQUITY OF HORSE-SHOEING.

BY JOSEPH GAMGEE, SEN.

HORSE-SHOEING: A SECTION OF THE
VETERINARY ART.

THE conviction having been come to that it was time England should take an example from Continental nations and found a Veterinary School, that object was put into effect in 1792.

Preliminary arrangements had been some time going on, and all was ready that year for opening the London Veterinary College at Camden Town. The members of the Hampshire Agricultural Society had, a few years before, conceived the undoubtedly wise project of selecting several aspiring young men to send to France, to prosecute the study and practice of the veterinary art at the veterinary schools of that country, with the view, on their return, of applying themselves to the promulgation of knowledge so to be acquired. But, as is now generally known, a gentleman, a native of France, and member of one of her veterinary schools, came to England with recommendations, and, other circumstances favouring, met with support as the propagator of a plan for founding a veterinary school in this country, which led to the abandonment of the first project, and the election of M. Charles Vial, commonly known as Sain-bel, the name of his native town, in the vicinity of Lyons. M. Sain-bel, as I shall continue to call him, was installed Professor and Principal of the London Veterinary College in May 1792, and in the autumn of that year the institution was in working order, with horses in the infirmary, and a small class of students, some of whom afterwards became distinguished members of the veterinary profession.

Had there been time for more than a preliminary programme, and taking the first steps in the course, than the school was deprived of its founder through death, which happened on the 1st August 1793. The school then,

with its few ardent students, was, by great misfortune, left without a guiding head in less than a year after its work had been fairly begun—no one having profited in the meantime sufficiently to carry on the instruction required. Of Sain-bel's qualifications for the post, had he lived, different opinions have been expressed, of which those of Blaine and Bracy Clark are worthy of notice. The former, by his own account, filled the office of demonstrator of anatomy, and otherwise assisted Sain-bel. The latter, Mr Clark, was one of the first, in point of time and merit, among his pupils. The first-named gentleman spoke in no favourable terms of Sain-bel's acquirements, especially as an anatomist; the latter most favourably on that subject especially.

Considering that witnesses often differ in opinion on the merits of a subject, with the identical facts before them, we are left to form our own judgment according to their relative suppositions, and the relevant incidents at our command. Mr Blaine, who was bred to the medical profession, was himself no mean anatomist, as his writings amply testify; and he was, moreover, as passages in his writings shew, a rival of his superior, of which the latter was cognizant. Blaine's opinion and criticisms must be taken, then, with allowances. Clark was more consistently favourable in his opinion, from his early years to those in old age, which may be taken—with what Sain-bel did in the short time he occupied the chair, and more particularly in the last two or three years preceding the opening of the college—as proof that sound judgment had been used in the choice of the man. But the best evidence we have of Sain-bel being a practical anatomist, is that which gained him favourable notice at the time—his dissection of Eclipse, the skeleton of which has been preserved. There is also a posthu-

mous volume of memoirs, one, among others, that had been published during the author's life—"An Essay on the Proportions of Eclipse" which, though it has been regarded as the test of his merit above the rest, I take a different view of, and believe that if the author had only left the skeleton, with a few notes on what he observed, and had not attempted the elaborate work he did, he would have served posterity better, and secured praise less mingled with regrets for obvious errors in the fulfilment.

Sain-bel's conceptions of phenomena which determine the speed of a horse, and such as the one he was describing, were creditable to the bias of his mind, and, even if not entirely original, were such as never had been worked out, and some of the details not contemplated. But it was in the details where the author failed; the combination of mechanical problems and physiological laws proved too much for the projector of the scheme. There is, however, this much to be said, which makes the failure in that work compatible with no mean talent and earnestness of purpose, that it involved problems which, as has been said, no living man at the time had attempted to solve, and which—so far from there being any able to do—no one detected the errors in the work; and, therefore, for sixty years after it was issued, the veterinary schools of this country adopted all the conclusions as standards on the form and action of the horse. It is, then, in my opinion, wrong to dwell on the faults which the author did not live to detect, much less to acknowledge, and correct his own mistakes.

But the "Essay on Grease," for which the author had been awarded a "Prize by the Royal Society of Medicine," in his own country, affords evidence, conclusive, to my mind, of Sain-bel's extensive knowledge of the veterinary art. By no one else has that loathsome affection been better described, or probably so many observations made on the characteristic phenomena accompanying it; it bears the stamp of the production of a philosophic inquiry of a man who had acquired experience. Other eyi-

dence of Sain-bel's qualification as a director of a school may be gathered from the programme issued, though in the working out of the plan he was only spared to see the beginning, and which, under the powers that succeeded, underwent change or annihilation.

The founder of the London College took as his models the veterinary schools of France, in so far as the different conditions permitted, not the least of which were those of the State across the Channel providing everything and overseeing all; and of private enterprise providing the means, or leaving much to chance, in England. Therefore, instead of four years' studentship, the minimum then, as now, of the French, candidates were only required to devote three years at the London school, according to Sain-bel's programme.

Between the period of the death of the first professor and the nomination of his successor, six months elapsed; and then, on the 17th February 1794, interests were so balanced that two gentlemen were elected instead of one—Mr Edward Coleman and Mr William Moorcroft—as joint-professors.

But, after saying a few words in explanation, I shall regard Mr Coleman alone as the finally installed professor. For the time, both had to accept the issue of the election; but there is no evidence of anything in common, or agreement subsisting between them, and Mr Moorcroft resigned his share of the post forty-five days after it had been conferred, viz., on the 4th of April thereafter. His election can therefore hardly be held to have been ratified by acceptance either of the honour or duties.

Mr Moorcroft, who was first brought up for the medical profession, but embraced that of the veterinary art, had visited the Continent, and passed some time at the veterinary school at Lyons; and, as the history of his subsequent career proved, was, of the competing candidates, the most and only one eligible for the post. After gaining a high reputation as a veterinary surgeon in Oxford Street, with whom the elder Mr Field was associated, Mr Moorcroft accepted an appointment as director of the studs of the East India Company, went out in 1805, and died at his post after twenty years' service.

Mr Coleman, who became the second occupant of the professorial chair at the veterinary college so soon after the instalment of the first, whose career had been cut short by death, was a graduated student of medicine and surgery, about twenty-four years of age, and while seeking to form a general practice, the tempting prospect of the professorship, though not at all in his line, turned up. He had, in accordance with the custom, served an apprenticeship with a surgeon and apothecary in Kent, and had, while prosecuting his studies in London, been favourably placed as resident with Mr Cline, and had for companion Mr, afterwards Sir Astley Cooper. It was beyond doubt that borough hospital connexion that enabled the young surgeon—fairly competent, probably, to have begun in a subordinate position in his own—to aspire to a post in another profession of which he was profoundly ignorant.

As an apology for such an anomalous procedure, it was said that Mr Coleman had dissected the eye of the horse, and made, during his studentship, other observations on the lower animals; to which it might be replied that few, if any, medical students worth the name do less, and the only inference that could be drawn from the setting up of claims on such small pretensions was, that there was nothing better to shew.

Seventy-six years have now passed since these events happened, and yet, though men and things are changed, the effects have accumulated in direct ratio to the extent of the interval.

What, it may be reasonably asked, would the newly fledged young medical gentleman do in the extraordinary position such as that of joint-professor in a department of most important knowledge,—knowledge little developed and unsettled, as it was, and about which he knew nothing? Again, and one may conceive it a still more perplexing position when, forty-five days later, he found himself abandoned to himself, and remained continuously alone—sole professor and principal of the only veterinary college in the British dominions. We are not left, however, to guess what might have been expected in such circumstances, but may

proceed to recount some of the things which actually happened.

Of course Mr Coleman prepared a course of lectures—out of what? Nobody ever knew; not he himself, probably. But before it can be understood of the little part even one course of lectures, delivered annually, could have played in the education of a body of young men, it may be well to glance at the accumulated duties devolved and accepted, with the enormous aggregate emoluments accruing. We can best establish our position at this point by reference to Mr Coleman's great demy-folio work (great in bulk, I mean), which he published just four years after he was elected to the chair, when his thoughts were first turned to the subject. The title runs thus—"Observations on the Structure, Economy, and Diseases of the Foot of the Horse, and on the Principles and Practice of Shoeing," by Edward Coleman, Professor of the Veterinary College, Principal Veterinary Surgeon to the British Cavalry, and to His Majesty's Most Honourable Board of Ordnance," &c. By virtue (or vice), which the state of things represented, an attraction to the professorial centre was set up, which led to the occupant of the chair becoming the referee in most legal disputes about horses which happened in England, and also to be consulted on the daily occurring difficult cases about soundness of horses among private parties. It happened, therefore, that while the college was in utter destitution in regard to teaching means, it was an *El Dorado* in point of lucrative resources for its principal; in fact, it was worked for the principal, and not on and for a principle.

After this historical sketch, it is my intention to pursue the inquiry, to shew the effect such a beginning had on the veterinary art in general, and on horse-shoeing especially, in after years, and how the influences may still be seen in operation.

A firm footing having been attained by Mr Coleman in his new position, he directed attention to the getting rid of rules laid down in the original prospectus, which were too stringent and precise in their working for his prospective plans. That bye-law which required three years' attendance at the

college on the part of candidates for the diploma, was annulled, if not formally, at least tacitly so, because we find that within three months of the appointment of the new occupant of the professorial chair, in the summer of 1794, those students who had entered at the time of opening the course of 1792-3 were admitted by the board, and became qualified veterinary surgeons, after attendance during Sain-bel's inaugural year, and another winter partly without a teacher.

Once allowed, that time was to form no essential part in the curriculum to be pursued, and all guarantees for the proficiency of the men were gone.

As that change, from three years to a few months' attendance, was adopted without any record being kept of the fact, and passed into custom without a question being seriously raised, were there any causes for the change? We cannot recognize the presence of effects without causes.

Mr Coleman, at the time, or soon after he was appointed principal, was entrusted with the entire management of the concern; all other powers were reserved, and of little more than formal influence.

Comparisons between the original veterinary schools of the Continent and our college with the forms it was taking, were only to be recognized in name.

At the Continental schools, the sums of money provided for the instruction of pupils were divided among an efficient staff of professors, according to their various positions. At ours, one professor received the whole, if not in a lump from many sources, one of which is sufficient to notice for the relevancy of cause of change in that rule—attendance of a few months, instead of four or even three years.

The principal took all the entrance fees of the students, which, at £21 for each—and these numbering from forty-five to sixty-five, in different years, and taking the mean—gives the handsome item of £1155. Now there was a temptation which flesh and blood could not resist, to make matters easy for young men to enter, with no other formality than paying the fee of twenty guineas. But

to make the returns large and annual, it was necessary to hold out to candidates for admission speedy results. Many a hard working farrier could be induced to send his son to the college for a few months who could less easily be persuaded to make the effort for three years; though, in the more ample time, corresponding results might be expected, while in the fragmentary and smattering course which entailed large expenditure in short time, positive harm was often done the men, and the minimum amount of good at the best. Under the established *regime* of the London Veterinary College, the time of attendance was optional with the pupils; it was a question, therefore, to some extent, of means with them; but as there was only one course of lectures delivered there, by Professor Coleman himself, which were written, as has been said at first, and lasted all the forty-five years of his power, they were mere repetitions from year to year, and no one with mental grasp could endure them a second time. His course consisted of about ninety lectures, which were delivered on alternate days from November to June inclusive; and that period constituted the college session, which was the average period of attendance at the college, though candidates were admissible at all times of the year, and three periodical examinations were held to accommodate their exit as qualified veterinarians.

But though the means of instruction were scanty, and of doubtful value within the college, the students had access to some without, and the character of the school rested on that outer element. All the eminent teachers of the day, in different branches of medicine and surgery, at the London schools, consented to admit a stated number of veterinary students to each course, gratis; that was a truly magnanimous act of a body of men, conspicuous among the great characters of the age; but the good effect intended was limited, through abuses, in the other direction. To profit by the means offered, time was necessary, and the veterinary college neither encouraged nor offered inducements for protracted stay, and it was both common and

reasonable for men to exclaim, We came here to learn all we can about horses, and not to go into other matters. The few who took the more liberal view profited proportionately by the wider field and teaching of able men. There was an objection taken by some to the gratuitous boon, affirming that if their lump fee charged at the veterinary college had been adjusted to the amount of instruction given, it would have been ample for the whole requirements, or could have been supplemented by a little addition; and that it was in reality Professor Coleman who was getting privileges proffered gratis, while he exacted the large sum for little work, and that badly done. For my own part, I have come to see, in later years more clearly than formerly, that with the instructions I obtained from Dr Pearson, Professor Brand, Mr Farraday, and Charles Bell, that I should have been better off, and had less to cast aside and replenish, if I had never heard a single lecture at the veterinary college, but had only been able to avail myself of the place for seeing and studying cases among the horses, always sent there in sufficient number. There was, moreover, the other great element of instruction always present at institutions partaking of the character of colleges—that of men congregating from remote parts, and among whom there are always some able on particular subjects, and our case was no exception to the rule.

Lectures, however, were not considered to be the sole means of teaching at the veterinary college even then, but were liable, as all lectures are on similar subjects, to the merit or objection of affecting all the rest. If the doctrines expounded are right, the practice based on them will not be radically wrong, and *vice versa*; if the minds of young men be filled with false ideas, the fruit will appear in the form of bad practice.

Mr Coleman, at the outset of his newly commenced career, had made choice of a speciality from among the multifarious subjects which the wide field of veterinary medicine and surgery offered to him. The foot of the horse and how it should be managed and

shod, is one which had occupied men of distinction from remote ages, and never more so than at the time just prior to and when the college was founded. The subject was then in vogue, and all sections of horsemen were ready to listen to anything that was supposed capable of diminishing the occurrence of lameness of horses, and therefore Mr Coleman took up that subject, not because he knew anything about it, for he was an utter stranger to everything relating to it, but because it was likely to attract notice and serve a purpose. The Professor's work, on "The Foot," &c., appeared in two parts, in 1798 and 1802 respectively, and which, along with his lectures on "the foot," were composed out of a common stock of materials. The printed matter, with the plates added, was simply the half-a-score lectures modified and enlarged on; therefore, that weight of literary work, all that Mr Coleman ever contributed, was elaborated between the period of his entrance on his course and the completion of the eight years that immediately ensued.

As I was one among about seventy students who, thirty years after the inauguration of that new order of things, sat gaping on the benches of the lecture theatre to listen to what we then regarded as the exposition of the advanced scientific views of "Coleman on the Foot," and believing that all was philosophic, and the original work of what we loyally regarded the logical mind of the man in whom we relied for directions in the start of our life's course of usefulness. I believed it, therefore, to be incumbent in after years, as opportunities had enabled me to undeceive myself, to try and aid my brethren in the same metamorphic process.

Consistently with the course I have taken, I shall proceed to shew further the grounds of my action by reference to the sources of digression, which had the effect of making all behind the scene appear profoundly dark, and all we saw upon the stage brilliant sunlight and ripe knowledge. I shall try and make out some of the chief sources—out of which came the ideas that formed that mess—the Coleman "Principles and Practice of Shoeing."

The Dairy and Poultry-Yard.

THE CARE OF CALVES.

WE doubt whether there is any one of the numerous departments of practical farming in connexion with which there exists such a diversity of opinion as the mode of treatment of calves in the earliest stages of their existence. Some maintain that the best way is to rear the calf by hand; others as strenuously insist upon the absolute necessity of allowing it to be nursed by the cow if good results are really required. And not only as to the mode of feeding is there diversity of opinion, but there is equally so—or perhaps even a greater extent—a diversity of opinion as to the kind of food to be used, in cases where the system of hand-rearing is adopted. Some give pure milk alone, others dilute it with water, or give skim milk. Some mix artificial foods with their milk, some give no milk at all, relying only upon these artificial foods. If we go to nature alone for our guidance, nature's lessons are so explicit as not to be easily misunderstood. Yet we are, of course, free to admit, in the modern system of treating stock, that nature's lessons are much modified by art, and modified, we are also free to admit, with much success. A celebrated accoucheur once jocosely, and yet with much truth, said, that if an infant was not in its mother's milk provided with all that was necessary to nourish its system, that nature would have sent it into the world with a pap-boat in one hand, and a packet of the material to fill it in the other. Like all sayings of this kind, while there was much of suggestive truth in it, still there was much of exaggeration, for we know that in practice circumstances do modify the course indicated by nature in such a way that we are compelled to bring in to our aid the resources of art; and doubtless

our authority just quoted found it even so in his practice, and so also with the subject now before us.

An examination of the milk of the cow shews that it yields all the constituents necessary to build up the frame and nourish the system of the calf; yet, nevertheless, we find in practice that, although this is the case, the cow is not always in the condition to supply the milk which the calf requires, nor in such a state of health as to admit of the calf suckling her even in cases where milk is abundant enough. But at this point we find strong evidence in favour of milk of good quality being the best food with which to feed the calf, or where the calf is, or has, to be fed by hand. For in the butter and the milk-sugar, which we find the milk to contain, we have the constituents necessary to keep up the warmth of the system, and to yield the fat which it requires. In the casein, we have an albuminized constituent yielding flesh and the tissues; in the mineral ingredients, the phosphates of lime, magnesia, and iron; and in the potass and the soda, the constituents necessary to maintain the growth of the bone system and the blood.

Milk, then, is the only food we have at command which contains all the elements of life required, and in precisely the best proportion—proportions which no artificial food can possibly give, however carefully that food may be made, and however closely the milk, as a standard, may be followed.

In an article, under the above head, recently given, we concluded our brief remarks by pointing out the fact that milk is the only food at the command of the farmer which yields—and in the proper proportion—all the constituents which the

animal economy of the calf demands. We now come to the mode in which that milk is to be, or should be, administered to the calf; and here we come across such a diversity of opinion that one is apt to be puzzled which is the best to follow. But before glancing at these various opinions, let us for a brief sentence or two return to the mode of rearing calves at the first, by allowing them to suckle their mothers, in order to glance at one or two points not yet considered in connexion with it. By allowing the calf to suckle its mother from the commencement of its existence, it has all the advantages of partaking of the beistings, or first milk yielded by the cow after calving. This, as is well known, is—if not different in constituents—certainly very different in character from the ordinary milk, and is known to possess certain qualities which have a good effect upon the bowels of the calf when partaking of it. Further, the calf after its birth is covered with a wet slimy substance, which the cow eagerly employs itself in licking off from the whole surface of the calf. Now, this process has a threefold benefit attached to it. In the first place, it soothes the cow, and keeps her in a quiescent state—quiet is of great importance in aiding the recovery of her strength; in the second place, the calf is benefited by it, for the licking tends to put the action of the skin into healthy exercise; and in the third place, the substance which the cow licks from the calf's body, passed into her own system, exercises a most beneficial influence upon the bowels. Moreover, another advantage is, that the udder of the cow is kept in a healthy condition by the action of the suckling of the calf. We thus see, what indeed is obvious enough, if we would only consider that all natural processes are well designed, that several healthy results arise from this arrangement. Here some may say that in carrying out of, or rather the permitting of these, can still be secured, by allowing the mother to lick the calf, and then to be taken from her; no doubt two out of the three advantages would be gained, but the third would be lost, as the cow, in place of being soothed and quieted, would

be disturbed; for after, even for a short time, being accustomed to her calf, she will feel its absence when taken from her. Again, it may be said that the calf need not necessarily be deprived of the beistings, or first milk drawn from the cow, for it may be drawn by hand, and given to the calf in the usual way by hand also. But this brings us to the disadvantage of hand-feeding—a disadvantage resulting from physiological facts which we cannot get rid of. It is well known that the cow has several stomachs, each of which has its own functions to fulfil. These are used by the animal after it reaches a certain age, but they are not all used by the calf when it is very young. When very young, nature designs that it should partake of its food at frequent intervals, but in small quantities at each interval; this is secured by the natural mode of suckling. But when fed by hand, the calf is apt to take more, and to get more—through the carelessness or the ignorance of attendants—than the food-digesting stomach can easily assimilate or take up: the result is, that it passes into the rumen, which, being thus prematurely set in action, either weakens the animal or induces disease. This also shews the danger of the practice of giving very young calves solid food. So much, then, for the natural mode of rearing calves.

We now come to consider the various modes substituted for it. One reason brought forward—even by those who approve, according to theory, of the natural mode—for dispensing with it is, that, where calves shew a greater precocity for feeding and making rapid progress than by the system of feeding by the hand, advantage may be taken to increase the food given in proportion. At the same time, if the cow be well supplied with milk, it is apparently a reasonable supposition that the calf, having this feeding precocity, will feel the calls of hunger correspondingly, and the more frequently help itself.

In continuation of this subject, we proceed to glance at a few of the methods of hand feeding which have been and are adopted. And here we would draw attention to the importance of carrying out the opera-

tions of hand feeding with care. For example, the calf should be trained to take its food slowly; bad results will assuredly follow upon allowing the calf to gulp down quickly its allotted portion of food. The more closely the manner in which it takes its food approaches the gradual process of suckling, the better; the attendant, on the calf being fed, especially at the earliest and earlier stages of its existence, should be at some pains to make the animal draw the milk through his hand, so that it may be forced, as it were, to take the food slowly. Calves are apt to drink too fast, and when this becomes a habit, it tells upon their condition. All this care involves time; but if it is not worth giving time to careful feeding of animals, which may ultimately become very valuable animals, feeding had better not to be undertaken at all. In no department of farming is the adage so applicable, "What is worth doing at all, is worth doing well," as in the department now under consideration. Some feeders use milk alone for the first four weeks; the quantities being, according to one authority, four quarts per day during the first week, given at two meals; five to six quarts per day, in two meals, during the second week and third week; six to seven quarts a day during the fourth week. After this artificial foods are added. Some again begin with a little artificial food with the milk, as oilcake dissolved. In giving the milk, care should be taken to have it warmed to about the same temperature as the mother's milk; and, as before stated, it should be so given that the calf takes it gently. About the fourth or fifth week, a little solid food may be given, but it should be of first-rate quality. A few slices of turnips may be given them also from time to time, and a few nuts of oilcake to nibble at will be well repaid in the increased good condition of the animals. A little meal should be added to the milk during the fifth, sixth, and seventh week. As the quantity of

solid food is increased, the milk or liquid food is decreased. A good deal of care and trouble is sometimes involved at the period when calves begin to eat solid food, some taking to it with great difficulty; others, again, take kindly and quickly to it. Some have quite a morbid desire to eat, and will eat almost anything that comes within their reach, and can be eaten. Straw in the long condition, they should be carefully kept from eating; it often induces internal complaints of a dangerous character. If they thus shew any tendency to eat their litter, they should be muzzled in order to prevent them doing so. This precaution, however, applies only to calves in the first ten or twelve days of their existence, before the chewing of the cud begins, after which they may be unmuzzled. Where new milk is scarce, the young calves may have skim milk thickened with linseed and wheatmeal.

Great care should be taken to keep the animals clean. Let them be well curry-combed, or, at all events, carefully rubbed down with straw. Nothing tends so well to keep them from lice as attention to the state of the skin by careful and frequent rubbing. Sometimes they are so troubled with vermin, that washing has to be resorted to; soft soap is the best substance to use in this case; but care should be taken to wash it well off, as if any is left it is apt to irritate the skin. It is scarcely necessary to say that after washing they should be rubbed dry, especially in wintry weather. Exposure to cold after washing, with wet hides, would be apt to bring on disease. The same may be said of exposure to wintry weather under any circumstances. It is a most mistaken policy to turn calves out too soon in cold weather. The state of the litter should be seen to. A great deal of disease is caused by the filthy condition in which calves are often littered. Let the straw be abundant in quantity and sweet in quality.

FRENCH POULTRY.

SOME time ago we drew attention to the fact that Americans were far before us in their management and rearing of poultry, and indeed, if we did not soon take active steps in the matter, we would shortly have no birds to compare with those the Americans will soon be able to produce. We find now, without going so far away as America, that "they manage these things far better in France" than we do. The Hon. Mrs Arbuthnot, in her "Henwife," has shewn us by long experience how she manages to make her poultry pay, and there are few farmers' wives who would not do well to "take a leaf from her book." The late Mr P. H. Frere, in the Royal Agricultural Society's *Journal*, thus describes the management of poultry in France, giving results which would make many an Englishman stare :—

"The consumption of eggs and poultry in France is very great, and the climate more suitable than with us to their rearing. The value of the poultry and game consumed in Paris rose from £560,000 in 1852, to £800,000 in 1862; and that of the eggs from £246,000 to £480,000. It is estimated that there is about five times as much poultry as game consumed. The population of the capital had meanwhile increased by 300,000 souls. It is calculated that, prior to 1789, the Parisians consumed annually 8 lb. per head of game and poultry; but in 1862, 30 lb.; a very significant index of increased wealth and prosperity. As a rule, the districts in France that grow buckwheat are famous for poultry, but not so those which grow rye. The mode of feeding in La Bresse is as follows:—The fowls of La Bresse have certain features which clearly distinguish them from other breeds of the neighbourhood. They are above the average size, short-legged, small-boned, the plumage white, with some few spots of grey. The comb is single, straight, and indented. They have four toes on the leg, which is brown and smooth; the skin is fine, and the flesh delicate and savoury. The hen begins to lay in February, and for a month or six weeks lays daily, then three or four times a week, till she has laid about 160 eggs, besides rearing two or three broods. Cocks are changed continually; local experience confirms the general opinion that the produce of young males fatten the most readily. The first broods come off in March, the earliest chickens appear at market at the beginning of May; they then, at two months old, weigh 2 lb., and sell for 2 to 2½ francs. The "pillettes" which are to become "poulardes" are put into the coop at the age of three to three and a-half months; the capons at four months. In the extreme cold of winter, the fattening process occupies three or four weeks longer than at other times. A fat poularde of La Bresse, at four or five months, weighs 6 lb.; a capon, six months old, 8 to 10 lb. The fattening goes on in a close and dark chamber; each fowl has a small box allotted to it, and is kept almost motionless. The food given is a mixture of the meal of white maize and of buckwheat, moistened with skim milk. The poultry-woman takes three or four between her knees, opens the beak with her left hand, and inserts a pellet with her right. After three or four weeks of fattening they are killed by bleeding them at the palate; they are carefully plucked at once, and then wrapped in a piece of fine linen steeped in milk, and fastened on with a piece of string; this is kept on until they are sold. The price varies with the season, and is highest about New Year's Day, especially if the weather is cold, and admits of carriage to a distance. The general run of prices at Bourg market is—for fowls, half-fat, weighing 3 lb., 2s. 6d. to 3s. 4d.; ditto, 4 lb., 4s. to 5s. Choice specimens :—Poulardes, 6 lb. (net), 7s. to 8s.; capons, 8 lb., 8s. to 10s.; 10 lb., 12s. to 14s. 6d. Very choice capons sometimes make as much as £1 a-piece. On every farm, poultry is fattened to a certain extent; but the trade in choice specimens is, in some measure, confined to small proprietors or farmers in certain communes on the borders of La Bresse and Revormont. One of these "Chambriers" will sell between September and March, 200 to 300 fowls, half-fat, or prime-fat specimens, making of his poultry alone from £3 to nearly £5 per acre of his occupation. The best food for fattening fowls is buckwheat meal "bolted" quite fine. This is kneaded up with sweet milk till it gets into the consistency of baker's dough; it is then cut up into rations about the size of two eggs, which are made into "rolls" about the thickness of a woman's finger, but varying with the sizes of the fowls; these are subdivided by a sloping cut into "patons," pellets, 2½ inches long. The chicken should have two meals in twenty-four hours, twelve hours apart, provided with the utmost punctuality; if it has to wait it becomes uneasy, if fed too soon it has an indigestion, and in either case loses weight. On the first day of cramming, only two or three pellets are given at each meal; the allowance is daily increased by one at a time till it reaches twelve to fifteen pellets. The stomach may be filled, but at each meal you must make sure that the last is duly digested, which is easily ascertained by gently handling the crop. If there be any dough in it, digestion has not gone on properly; the fowl must miss a meal, and have rather a smaller allowance next time; if too much food be forced upon the animal at first, it will get out of health and have to be set at liberty. The fattening process ought to be complete in two or three weeks; but for extra fat poultry twenty-five or twenty-six days are required; with good management you may go on for thirty days."

The Country Gentlewoman.

LETTERS TO FARMERS' DAUGHTERS.

III.—PHYSIOLOGICAL CULTURE.

DEAR GIRLS,—If there is any one moment in life where we naturally expect to find perfect health, it is among the country girls. But in spite of country air and healthful employment, too many are feeling the inroads of pain and disease.

This is traceable to many causes. There are extremes in farm life. Many, perhaps a majority, are overburdened with hard, tiring toils, bending every energy to amassing property, or to the provision of pressing wants.

In many such homes but little care is bestowed upon the laws of health. The heated, anxious mother and daughter, sit down at their meals regardless of nature's demands, eat first; either turning away in disgust at the food which their own hands have prepared, or eating rapidly, that they may quickly despatch the meal to go at more work. In either case, laying the seeds of dyspepsia and nervous debility. In such cases, girls are often overdone, and find no time nor inclination to gratify their desire for beauty, personal adornment, or intellectual culture.

Parents are not all aware that exercise of the kind is not the right kind. Sweeping, scrubbing, cooking, &c., bring into violent exertion certain sets of muscles, while others remain dormant. Walking, horseback riding, and running—especially the former—call into action different muscles, strengthen the respiratory organs, oxygenize the blood, sending it to the extremities, and give such a healthful tone to the system as cannot possibly be acquired over the kitchen fire or under the roof. There is another extreme among the agricultural classes, to whom fortune has been so

favourable that they are not compelled to daily exertion, and so have fallen into the mistaken notion that indolence and lavish expenditure are the signs of ladyhood. The brothers and fathers of such are often seen in the coarsest apparel, while the daughters flaunt the last new fashion in bonnets, boots, &c. If weariness and toil are not their portion, such at least might shed the benign influence of their sunshiny lives upon some needier heart.

To each, my dear girls, in your several stations, varied needs and different aspirations, I would I had an all-potent voice to reach your inner consciousness, while begging you to preserve your health and strength.

The richest mind is of no avail, if shut within a sickly body. Between mind and body exists a mysterious relation; each act and react upon the other. An irritable, painful body is a constant flame to the mind, and a restless, passionate spirit wears upon the body. This is a momentous fact, overlooked by most; but if you care to possess a cultivated, well-balanced intellect and judgment, the *body* must be your first care.

If you prize beauty—if you would claim an equality with your brother, man—if you would drink to the full the cup of life in its sweetness, richness, and sublimity—if you would make the world better for *your* having lived—in short, if you would *really live*, take care of, nurture and cherish, the casket which contains that precious gem—the mind. Oh, that you would remember that in womanhood are wrapped up the greatest issues of humanity!

My affectionate advice to you in health, if you would remain so, is to make yourselves acquainted with the physiology of your own

systems, and what conditions are necessary to the most perfect physical development. Follow the dictates of nature in *dress*, which would lead you to wear warm, thick boots and stockings, and loose, short, flowing dresses; sleep in cool, well-ventilated rooms; bathe daily in clear water, tempered to suit the condition of the system; eat freely of fruit and bread, not rejecting the coarse flour, if you would have handsome teeth and a fine colour; use very little salt meat, or animal food of any kind oftener than once a-day; be *regular* as to sleep and diet; always sleep when nature demands it; be *much* in the sunshine and open air; ride when you can; and if you are needed in the dairy, you need be none the less a *lady*—every inch for it.

About your work, wear short and perfectly *loose* clothing; cut your dresses short on the shoulders, and let all your clothing be supported from the shoulders; avoid wearing any weight or much warmth about the hips; be in daily practice of gymnastic exercises; cultivate a cheery, amiable disposition, strength of mind, and a devout heart. The result of this course will be health, beauty, and happiness. With such a physical training, you are prepared to seek intellectual culture. After you have fully developed the muscles of the body, you are ready to train the muscles of the mind to hard work. After you have strengthened and vitalized the nervous system, you are ready to discipline the nerves of your mind to close application and vigorous research.

Perhaps some of my readers are stunted in school privileges, and, as a result, feel discouraged in attempting to climb the steep of knowledge. Remember that schools are not necessary to, but only *helps* to knowledge. In a previous letter, I reminded you of the helps you have in *nature*; and the world is full of good books from which you may glean priceless treasures. Then you possess the power of *thought*, and to *think* is to educate. *This* is what you want: investigate nature and books, and dig for thought. Search for *ideas*.

Before closing this letter, let me remind you that womanhood, with its solemn duties,

precious privileges, and painful uncertainties, awaits you. It is a momentous fact, that we descend into our children, in our weakness or strength, our greatness or littleness, as we have lived.

Oh, then, buckle on anew the armour of life! Seek health, beauty, knowledge, and goodness, that you may wield a mighty sceptre for good, and impress yourselves upon the many yet unborn in all that is choice and excellent, and to be desired,—Your true friend,
T. S. H.

IV.—CULTURE OF THE BEAUTIFUL.

MY DEAR GIRLS,—Did you ever think how the Creator must love beauty? What lavish expenditure of taste meets the eye on every hand! Every mountain, rock, and tree, is a statue of beauty. Every outspread landscape is a picture of beauty. The carpet of green at our feet—every leaf, vine, and flower is a form of beauty—"God's smiles to man!" Every floating mist-wreath is a shadowy reflection of beauty. Every stream and ocean bed is a glassy mirror of beauty. Every star above us is a blazing face of beauty.

What beauty in motion! Winds, waves, clouds, and trees, as well as the myriads of insects and all animate creation, seems to dance their eternal cotillion of glory.

None of us love beauty too well; they who court it most devoutly are nearest kin to angels. One who has no love of beauty—if indeed such a one could be found—is very near the brute creation. To cultivate, then, most assiduously—in our persons, characters, and homes—every form of beauty, becomes a duty and privilege.

A healthy body, joined to a peaceful mind, a cultivated intellect, and a lovely, unselfish disposition, will impart a charm to the face, in spite of irregular features; neatness in the simplest dress, joined to graceful, winning manners, beautifies any figure. That home, unadorned with costly *dagere*, elegant mirrors and Brussels carpets, yet possesses undescrivable charms, contrived from a mother and sister's delicate and fertile taste.

My dear girls, are any of you inclined to envy your more wealthy neighbour, or the costly city home of some elegant schoolmate? Do some of you feel your sense of the beautiful stifled and starved in a barn home? Let me remind you that every woman's nature possesses some innate power to beautify and adorn, if she will but cultivate it. Let me tell you what I saw last month in a pleasant rural home, where the daughters have narrow means, and many difficulties to compass, not the least of which is a father, whom it is not always easy to bring round to their ways of thinking.

As it is early in the forenoon, we may suppose our friends to be engaged in the dairy or kitchen, or preparing for dinner; so, if you have a mind to follow, we will enter by this pleasant south door into the neat sitting-room.

A glimpse into the cool, wide kitchen, looks as if all work had been accomplished there some day last week—so still and clean does it seem.

Did you observe that woodbine over the door as we entered, with that climbing clematis, and that stand of plants under the east window? That elegant foliage plant, and those varieties of geraniums, were procured for a mere nothing, as they were slips which were cast under foot by a gardener in the next town; and those sweet monthly roses can easily be obtained from some friend who has thrifty ones. A few minutes each day, to turn them round to the light, sprinkle and dust them, with an occasional addition to the earth, will cause them to flourish, ensure their growth, fill your house with fragrance, and your heart with pleasure amid the pauses of toil.

See those hanging shelves; are they not beautiful? Miss Emma watched her chance, after her father built that nice carriage-house across the garden, to gather some bits of board, and sent them by Dick to get planed and stained, and afterwards the leather work to put on the edges, sides, and top, with a chain of the same fanciful festooning, and the result is that beauty. In that corner is a catch-all, for

father's papers. It is three-cornered in shape, manufactured from pasteboard, and covered with shells. Miss Emma has taken time to gather, clean, and colour them crimson and purple, which, mixed with white, cause a brilliant effect. These she has glued to the pasteboard, and with cords for hanging, this article of taste and convenience is completed.

The parlour door stands open, and through the softened light, in the farther corner, you may see a what-not which is entirely home-made. All blemishes or defects are hidden by a cornice or edging of these same many-coloured shells.

In another corner stands a marvel of beauty, in the shape of a very pretty table, made of willows, and here you will observe the chairs are of the same ingenious pattern. Miss Emma and her brother took pains to learn some of the mysteries of willow-work last season, and here is the result.

If you look up, you will notice the walls are hung with a few choice engravings, but mostly with well executed drawings and paintings, from the younger sister's brain and fingers, framed in fantastic devices of cones, fruit, shells, leather work, &c.

We might take a peep into every room, and find scattered everywhere articles combining convenience and beauty—the charming results of fertile tastes and ingenious fingers.

No home need be barren of attractions if a well-directed energy and improved opportunities are made instruments to this end. Ah! girls, for the sake of joys you may impart and receive—for the sake of homes waiting you as mistresses—that you may be like all that is fairest in earth and sky, cultivate beauty. If there be any lack in your home, and in yourselves, strive the more earnestly to make up for these defects by removing that which is offensive, covering that which is imperfect, and adorning that which is plain. If your tea-table lacks in quality and quantity, place flowers upon it. Carry out this principle in every department, and your homes will be beautiful and your lives yield a fragrance sweeter than the rose.

—Yours heartily,

T. S. H.

V.—INDOLENCE AND INDUSTRY.

MY DEAR GIRLS,—To be idle is to be miserable. No one has a right to be idle, though he be heir to millions of wealth. Neither mind nor body can be truly healthy without a thorough systematic habit of industry. Life is full of temptations to the indolent that the industrious know nothing of. Dr Holland says truly, that he who has nothing to do is the devil's play-fellow! He has no choice in the matter, for he can find no sympathy anywhere else. The good, and decent, and truly great, have not a minute to devote to such. Industrious habits bring many casual payments, among which are health, self-respect, and the regard of those whose esteem we value. Sleep waits not to be wooed, and temptation flees to idle haunts; and a bond of sympathy rivets the industrious to all grand movements of the times.

My dear girls, have you some fair goal to which you aspire, of wealth, culture, education? Improve, then, the moments; fritter them not away in idleness, dissipation, or fruitless repining. Set your face as a flint toward that to which you aspire. *Dig* for your treasure. Make circumstances bend to your will, instead of being controlled by circumstances, and you will achieve a victory all the more complete and brilliant for conquered difficulties.

I have said in a previous letter that no woman has a right to be dependent, except when sick. It is just as ignoble in woman as in man. An independence, reliable and self-

supporting, should be acquired by every woman, that, when adversity or need comes upon her or her dear ones, she may, like the pine on the Alpine glacier, strike her roots into the rock crevices, and when the winds, and snows, and storms assail, strike down her anchoring roots the deeper. Thus fortified, she will be able to brace herself to meet the severest emergencies.

Let me advise you, then, whether rich or poor, needed at home or otherwise, to learn something in the way of business which shall make you independent. You will make none the less suitable wives and daughters. Dignity of character, with resolute action and will, with strong internal resources, are as much needed in wives as in husbands.

Great men are found in all paths of life; so may women be, provided they do not drop their womanly instincts. I would not have woman forget her chief end and object in life, but rather fit her for it, and crown her with all the dignity and power of a true womanhood.

Indolence will not make a woman womanly, neither will ignorance of business and the world. The history of every country should have as much to record of its women as its men; but this can never be till she buckles the armour on anew for the duties and privileges of life.

See to it, my dear girls, that you bear your part as strong, brave, educated, independent, and useful women, whom history will be proud to record!—Yours for work,

T. S. H.

THE COUNTRY GENTLEMAN'S MAGAZINE

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THE IRISH LAND DIFFICULTY—LARGE AND SMALL FARMS.

BEFORE going to the Continent to see what proof there is—as proof, we are told, we shall there find—in favour of small holdings as against large, and in proof, moreover, that the present system is specially adapted to Ireland, let us stop at a point intermediate, and see what proof we can get there in favour of this view. The condition of the Scilly Islands some years ago was such as made it one of the most pitiable positions. Words fail to describe the misery endured by the people—a condition so deplorable, that it seemed to shut out all hope of whatever of a brighter day dawning upon them, or of their ever being in a better position. But these islands were at last rescued to one who had the means and the will to bring about a better order of things. He found the many evils which he found existing, and the chief of the “cottier system” was the chief. Under that system, “each family was settled on a small portion of land, that was often divided in minute fragments over the islands; on the death of the father, such little farm was divided equally among his children. The present system had introduced a pauperized population, which was continually increasing under this system of sub-division, and mainly dependent for subsistence on the produce of these minute farms. These small holdings were consolidated, one of each family was permitted to take the farm.” Other

means were taken—as providing good education, by which the young population were enabled to take other employment abroad; and in a short time the good effects were “marvellous.” The proprietor allowed one son in each farm to succeed his father on death; but the people soon found that “small farming was unprofitable work,” and turned their attention to other callings. We have quoted the parts of a most interesting report, recently published on the subject, which bear upon the point under discussion; but we have quoted enough to shew that here, under an improved system, which opened up new fields of work for the population, we find the same process going on which has been going on for years in this country—the small farmers giving place to the large ones. It may be said that this subdivision of land, under a new *régime*, would not be allowed to go on in Ireland. It might not be so legally; but, if we know the Irish aright, it would go on for all that, as the desire to possess a “bit of land” is strong to a degree that we know nothing of on this side the Channel.

Let us now go fairly into those countries where we are told we shall find the whole benefits of the small holding system fully and fairly shewn. We confess that the inquiry here opened up is a wide one, to which we cannot, in the short space at our disposal, do anything like justice. We shall therefore be compelled to put what we have to say in the

shape of general assertions, premising that for these, however, we have the best authority. Starting, then, with what may be called the *prima facie* result of personal investigation of the small farm system met with throughout the Continent, does that convey the idea of the system being one which gives wealth or comfort to those carrying it out? We confess at once that this is not proof either way. A man may look squalid and poverty-stricken, and yet be rich; but still, as a rule, this obtains, that external indications are generally given of internal wealth and comfort. Now, we maintain that the result of a personal investigation of the small farm abroad gives, at first sight, the conclusion that it is not a comfort-securing, not to say anything of a money-making life. To quote the words of an authority, the general impression of agricultural life abroad is, that it is one of "general squalor and hardness." There are exceptions to this notably in Belgium; but here, let it be noted, that it is only in certain parts of Belgium, as in East and West Flanders, that the bright "side of peasant farming is to be seen." Belgium is generally spoken of as the country, *par excellence*, in which small farming has done such wonders; but this is a mistake; it is only, as stated above, in certain districts of it that the best results are to be seen; for in other parts of Belgium as bad farming is to be met with as in any part of Europe. To this point we shall have occasion to return; meanwhile, we may say, that even in those districts of Belgium where the best farming is to be met with in the small farm, the results are by no means so satisfactory to the farmers as we have been led to suppose. True, that a large degree of comfort is obtained, but as to money-making, even under the best circumstances, that is not the result. It is only "by dint of economy and *privations*," says one eminent Continental agricultural authority, that they "get round, and this at the end of thirty or forty years." A long time this for a man to get the advantage of capital laid out by him in the purchase of his farm—so long a time, that one may easily conclude that not much benefit can accrue to the nation

at large by such a system. We have said that in the best districts of Belgium, the small farm system may and often does secure comfort, if it does not secure handsome returns. But at what sacrifice is this comfort obtained? At the outlay of an industry so untiring, and by the exercise of prudence and economy so rigid, that we venture to say that few of our people would give, and few are disposed to exercise them. We appeal to those who know what farming life in Flanders is—those districts of Belgium where *la petite culture* is carried out to perfection—if it is not a life of almost perpetual labour? The farmers and their labourers work literally from early morning to late at night. True, the result is a style of clean and careful cultivation, which would put, and does put, to the blush that of farms generally in this country. But if the result to the farmers themselves is so small in pecuniary benefits, and, at the best, in no great amount of personal and household comfort, what would the result be in these directions—what are they in fact—in cases where untiring long-sustained industry is not the rule, nor prudence and economy rigidly exercised? It is the fashion with some writers who do not advocate small farms, to decry the style of farming met with in Flanders, this going, as they think it goes, to prove that the small farming of these celebrated districts is bad; but the truth is, that the general argument is made all the stronger if we can shew, as can easily be shewn, that the style of farming in Flanders is, as a rule, wonderfully good, and in some respects specially so; and yet that, with all the advantages of this, and of a prudence and industry beyond all praise, that it does not pay—pay, we mean, in the enlarged sense—that it does not contribute so much to the general means of the nation as the same lands would do if thrown together into large farms, and cultivated with all the skill and all the appliances which the possession of capital can command.

It is to Belgium chiefly that the advocates of small farms send us; but we have shewn that it is only in one part of Belgium that the system shews its brightest side—a fact not by any means generally known

there can be no doubt of this, that if agriculture was to be dependent upon the resources of food which this system of the part of Belgium could give and does the nation would be placed in a bad position. This is the opinion of men who are in every way calculated to be agricultural authorities. Nor is the extension of the system to be desired which forces those who live under it to work so hard, and to secure a degree of economy which has been characterized as "dreary parsimony," and results so trifling. And an extension of the system is not desired by many Continental agriculturists, who know what the system is, and are aware of its economic results. We have admitted that these results are good in many respects, so far as cultivation of the soil is concerned, in those districts of Belgium to which we have just specially referred. But

as we have said, offer the best or the worst side of peasant or small farming; the system is widely different in other and by no means the greatest number of other districts on the continent, where the good farming of Flanders is observable. But it is here worth while to inquire whether the small farm system held by peasant proprietors exists in Belgium to the extent it does, as stated by its advocates.

We believe that very erroneous opinions exist on this point. Taking the latest Government Report, it would appear, generally, that about one-third of the land was cultivated by proprietors, and about one-half was occupied by large proprietors, and by parties occupied in trade

in large towns; the peasant proprietors forming a small number, comparatively, of the population. And that the condition of the peasant proprietors is not encouraging,

may be gathered from the exertions made by the Government to help them. This is further corroborated by the reports of agricultural societies, and by special works published on agriculture. Indeed, if one was to judge from what he reads and meets with in the country itself, the conclusion would be inevitable, that the condition of farming in the small holdings is in the lowest possible condition. But we have seen that there are fine exceptions to this in some districts; but the misfortune is, that the public in this country have been led to suppose that these districts are, in fact, the whole of Belgium, hence the *coulour de rose* statements which have been handed about amongst us so long and so persistently that they are almost universally believed in; and Belgium is always, therefore, pointed out as the very "paradise of peasant proprietors," and looked to as an example of the system that would do in Ireland. Even in those districts of Belgium where it has been most successful, that success—no great thing to boast of, as regards its influence in raising the social condition of the holders—is obtained only by the exercise of an untiring industry, and the rigid exercise of unsparing economy and prudence; the exercise of which are, we do not hesitate to say, quite beyond the powers of Irish small farmers; at least they have yet given us no indication of either their ability or willingness to exercise them. Indeed, we affirm, without any fear of contradiction, that the Irish farmers, or small proprietors, are the very antipodes of the same class in Flanders. In all the qualities which ensure success, the Irish have a long march to make before they can come abreast with the Flemish peasant.

WHAT ARE THE GAME-LAWS?

THIS most fertile source of ill-will between landlords and tenants forms a daily subject of conversation and debate; and yet how few people know exactly what these laws are, nor the effect on the relations between landlord and tenant if the whole were abolished. Mr James Paterson, a London barrister, has written a very concise treatise on the subject of these laws, and has, so to say, codified all the statutes regarding them; and to this excellent volume we commend the attention of our readers. It tells us what the Game-laws really are, and how they affect the relation between landlord and tenant. The volume is prefaced by a very clearly written Introduction, in which the action of the laws is clearly set forth; and from this Introduction we now present the following summary to our readers:—

GAME-LAWS GENERALLY.

The Game-laws carry us back to a state of nature when rudimentary notions of property floated loosely in the savage mind. Their history is now, however, more properly left to antiquarians. In modern times, though they still embody one or two elementary principles, on which the Red Indian daily pursues his avocations, they are mainly a network of factitious enactments designed to secure, in a circuitous way, to landed proprietors what the common law declares them clearly entitled to, viz., the exclusive use and possession of the surface of their land. If by any legal machinery this great object could be accomplished effectually, poaching would become impossible; for if we could only shut out the poacher from the fields and woods, either by physical or metaphysical barriers, so that he could no longer get at the game, that would be all that anybody would desire. The errorism of spring guns, rigorous penalties, and lofty brick walls, having been tried without success, the Game-laws still remain simply an *œuvre* of legislation, more or less imperfect, to

secure this great end of civilization, the fullest possible enjoyment of one's own property.

HOW NECESSARY.

Whatever character the Game-laws may be entitled to, on the score of severity, they have arisen inevitably out of the obvious defects of the common law. Though founded on the most liberal maxims, the common law was content to repose mainly on theory; it gave the owner the exclusive use of his land, but left him without the means of effectually securing that use. Hence the Legislature necessarily stepped in from time to time, and built up the formidable pile of enactments, now denominated the Game-laws, all of which are supposed to point to the one great end, that of giving an owner the exclusive enjoyment of his own rood of ground.

GAME, HOW FAR PROPERTY.

Game is now practically defined by the Legislature to include hares and a few varieties of birds, though Ireland and Scotland do not quite agree with England on the point. The desire to pursue game for food is believed by the poacher to be inherent in human nature—an irrepressible instinct which it is impious in Legislatures to restrain. Most people agree with him as to the attractions of game, both as an object of healthful pursuit as well as an article of food. The creatures themselves are known to frequent the land, and that is their whole history. They are here to-day, and to-morrow are elsewhere. At best they are mere windfalls or perquisites of the soil. They do not come within the category of property, simply because nature has endowed them with an essentially vagrant, shy, and impersonal character. Property is what can be kept under control and identified; and both these characteristics are here conspicuous for their absence. Game in its native state can neither be identified nor kept at home. Hence it was not to be wondered at that the common law treated game, like other wild

ls which have not been tamed or re-into possession, as wanting the charac- of property. It cannot be stolen—only be “taken.” Larceny is not the word, and the offence is not a felony, it a misdemeanour, but only punishable arily, and that only when the act is done gh the instrumentality of a trespass on er’s land. As to the graver case of ing by night, not the first nor the second e, but the third offence only is a mis- inour; yet as to hares and rabbits, even offence is now a misdemeanor, owing unexpected effect of recent codification. of these offences, however, is larceny; re only an illegal taking of the game. indeed, a point on which the poacher reat store, that, bad as he is, he is not mon thief, and in this respect he is a l lawyer.

e common law therefore does not treat in its wild state, or up to the poaching as property; yet sometimes we hear it ted that the law does not so treat it, ut it in the same category as sheep or . If, however, the Legislature were to unce its *fiat* to-morrow, “let game be rty,” that would be found not at all to ge the essential character of the thing. e would still be no means of identifying property. Nobody could swear to a ular pheasant, nor could speak to where t the night before, if that fact were to ; it seems it must then be, the new test : proprietorship.

GAME AS SPECIAL PROPERTY AT LAW.

t though the common law does not treat game as property susceptible of larceny, its it as property *sub modo*—as a special onary kind of property—as that kind ght to the game which is sufficient to id an action at law to recover it. The “property” is used accordingly only in oose sense, when it is said that by the ion law game is the property of the r of the soil so long as it is on his soil. is merely said because it belongs to no- else. The owner of the soil, having the ight of making use of the surface, and by acquiring all the windfalls that come

upon it, has the best right to the game there, and if a trespasser comes to usurp that use of the surface which enables him to catch a hare or pheasant, he would be profiting by his own wrong if he were allowed to keep it against me, whose land gave me the best claim to it. But even the maxim that the game is mine while it is on my ground, is not without an exception, which Chief Justice Holt is said to have deduced from the Year Books. This exception is, that the game is not mine, as against a trespasser, unless it was both started and caught on my ground. And hence, if a trespasser start a hare on my land, and chase and catch it on the lands of my neighbour, the trespasser is entitled to the hare as a reward of his perseverance, though both I and my neighbour can sue him for the trespass. This doctrine is borrowed from the civil law, which borrowed it from the Red Indians, and thus in the heart of the English common law is found enclosed this curious bit of nature. The Game Acts have so far qualified this doctrine, that I and my neighbour, if we prefer it to the elusory process of an action at law, may convene the trespasser before petty sessions; and if my neighbour had happened to be on the spot when the hare was caught, he might have even demanded and seized the hare out of the trespasser’s hands. This is, however, solely by virtue of a power conferred by the Game Acts. In most cases, accordingly, the trespasser would, by the common law, which is still unaltered, keep and eat his hare in security, however numerous may be the penalties he incurs in catching it. The Scotch common law is still more favourable to the hunter in his trespasses, for it matters not whether he both started and killed the game on my lands or not, he is entitled to it against me and all the landowners in the kingdom.

GAME-LAWS DO NOT INTERFERE WITH RIGHT TO GAME.

The Game-laws, as a general rule, do not interfere with the right of these respective parties to the game, as settled by the common law, and only give a limited power to take game from poachers if caught on the spot and in the act, which of course seldom occur

This only shews that the great thing dealt with by these statutes affecting game is the law of trespass.

THE COMMON LAW OF TRESPASS.

The common law is most liberal in its maxims, as regards the exclusive right of an owner to his rood of ground. Not only is he entitled to the exclusive use of the surface of his land, but he can dig down to the centre of the earth, and build as high as the sky. So far as digging and building go, his rights are, in general (if not restricted by the state of his neighbour's lands and rights), unlimited. No case, however, has gone the length of saying that he has a vested right to the pyramid of superincumbent air above his close, and all that is in it; otherwise there would be small hope of the aeronaut ever doing much good. But whether his land is fenced or not, it is surrounded, in the eye of the law, with an invisible barrier, through which no stranger has a right to pass: he cannot at least do so with entire impunity. It is immaterial what the object or motive of the trespass may be—whether to botanize, or to admire the scenery, or to recover his hat which a gust of wind may have blown over the wall. In very few cases indeed is a trespass justifiable. If a party trespass, therefore, he is liable to an action at law, at the instance of the owner or occupier of the soil.

AS BETWEEN LANDLORD AND TENANT.

It is said the owner or occupier may bring this action. This requires some explanation. The contract between landlord and tenant, commonly called a lease, is nothing else than a contract, by which, in consideration of a rent, the landlord or owner transfers to the tenant, or occupier, the right to the exclusive use and enjoyment of the surface of the land and its fruits. So that, as a general rule, all the rights which the owner has at common law, with regard to the surface, and with regard to trespassers, are transferred to the tenant, who stands in his shoes. Hence it is, also, that at common law, the tenant, having the right to the exclusive use of the land, as a necessary consequence, all the

windfalls, including game, which come upon the land; and he can warn off all trespassers, and bring an action at law against these, if he prefers it. The tenant therefore at common law gets all the game, for his landlord has then as little right to come on the lands and search for game as any other trespasser. *It is only by reason of some stipulation contained in the lease, that these rights are reversed or varied, as they frequently are, especially as regards game.* That is of course a matter of bargain between them. If the tenant choose to take a lease of the lands, giving his landlord the right of coming on at all times to take the game, he does so with his eyes open, and cannot quarrel with his position. *The Game-laws do not, except to a very limited extent, alter the general law as between landlord and tenant as to game;* that is now, however, almost invariably made a matter of special agreement between the two parties; and it is needless to say, there is no limit to the variations that can be made in the respective situations of landlord and tenant by way of contract or agreement.

PUSHING OFF TRESPASSERS.

When it is said that the owner or occupier has a right to bring an action at law against all trespassers, it should first be stated that there is a mode of redress also sanctioned by the common law, which is perhaps the favourite, because more expeditious remedy, viz., the pushing off of a trespasser by force. This liberty is also derived from an aboriginal state of nature, and is probably practised in all civilized as well as uncivilized communities. When a person comes on my lands who has no right to come, or has no justifiable reason for remaining, the common law allows me to desire him to quit *instantly*, and if he do not obey, to push him off without unnecessary violence. If he is too strong for me, I must either push him in a superior manner, or call in assistance. I am not allowed to use weapons, or attempt violence; but I may always use just enough of force, and no more, to push the trespasser off. It will be seen that this is quite as much a muscular as a legal right; it is a right which is available only to the able-bodied; the halt,

the lame, and the blind, can scarcely hope to succeed, for it generally ends in a trial of physical force. The act of pushing, or rebutting, as it might be called, is also often a dangerous practice, for unless it is done with great moderation and suavity, it is apt to engender ill-blood in the trespasser; and however scientifically the owner applies "just a little more" force to overbear that of his opponent, this nicely graduated appliance of muscular law is often unappreciated, and from expostulation, menaces, and pushing, the contest grows to blows, to bloodshed, and sometimes to homicide.

SPRING GUNS.

Another remedy which the common law either winked at, or at least did not decidedly repudiate, was practised a good deal about forty years ago, viz., the planting of spring guns and man traps on the owner's grounds. The better opinion of the common law courts was, that it was quite legal to protect one's lands in this way; but owing to several lamentable accidents, and the imminent prospect of more, the Legislature intervened, and curtailed this natural liberty of proprietors by forbidding in future the use of those engines, which were too apt to sacrifice friend and foe alike, and now they are illegal, except in one's dwelling house. In Scotland, indeed, the common law courts pronounced them at once to be illegal, so that a statute there was unnecessary.

ACTION AT LAW AGAINST TRESPASSER.

The other remedy which the common law gives to the owner and occupier of land against trespassers is an action at law. What, then, is an action at law? An action at law is commenced by serving the trespasser with a document in the Queen's name, after which various other documents are exchanged, and proceedings silently go on at the owner's expense, until the final stage is arrived at, some six months after the act is done, and when a jury at the assizes meet and assess the damages. Assuming that the case has not been "laughed out" of court, that the trespasser has met with a hostile verdict, and that it draws in its train the liability to costs

of both sides, the trespasser is then saddled with, say £100 and upwards of costs. Now if he is a poor man, as he generally is, without capital, the successful plaintiff is in the enviable position of having the choice of recovering his own costs of £50 and upwards, which have been already incurred, out of no assets. It needs no arithmetical computation to say when and how he will ever get his money. Yet if the trespasser is not imprisoned for the costs, he can awake next morning and commit a fresh trespass, and every day repeat another, each of which can only be avenged some six months and more thereafter, at an expense of £50 and upwards per action. The county courts, it is true, cheapen and quicken the progress of an action, but in other respects the result is no better.

SUMMARY REMEDY AT PETTY SESSIONS.

The above being the remedy afforded by the common law, it was not to be wondered at that recourse should be desired, in preference, to the more swift, sharp, and decisive action of petty sessions, by which the offender, instead of being charged after eight or ten months' delay with a mere pecuniary debt, so large that he can never hope to pay it, is at once amerced in a moderate fine, and failing immediate or prompt payment, is committed to the house of correction, with or without hard labour. This is supposed to strike more terror into the mind of a labourer than the illusory and far-fetched punishment of the superior and county courts, and the Game-laws merely consist of various enactments visiting common trespassers in search of game with this sharp and summary chastisement.

SPECIAL POWERS TO ARREST TRESPASSERS AND SEIZE GAME.

The Game-laws, over and above inflicting speedy punishment for a trespass in search of game, give also in general to the owner of the game, *i.e.*, the party entitled to shoot on the lands, as well as to the occupier of the lands, and to their gamekeepers and servants, a power not only to arrest the trespasser, if he refuse to tell his name and address, but to

seize and confiscate the game in his hands, and sometimes even to seize the dog and gun. At common law no person would be entitled to do this; for as the poacher, at common law, took merely what was the property of nobody else, he was *prima facie* entitled to keep the game, and though the owner or occupier of the land on which the game was both started and killed, might have brought an action at law for its value, the latter could not have seized it *brevi manu*. To do so would be to take the law into his own hands. The game statutes, by giving this power, whether justly or not, no doubt bring into play an element of "the greatest danger, and from which all the scandalous bloodshed often attributed to these statutes takes its rise. It invites in fact a contest in every case between the poacher and gamekeeper; and as both are generally armed with deadly weapons, and probably both are equally chargeable with excessive violence, hence occasional manslaughter and murder are unavoidable. The value of the game is not great, and the object to be gained scarcely justifies this great risk to the lives of both parties which ensues. It may be said, however, that without these powers the trespasser would altogether escape, and the evil would only grow with the impunity. Probably this answer is sufficient; nevertheless the subject is worthy of the consideration of the Legislature, how far these extraordinary powers are necessary and expedient.

DEFECTS OF LAW AS TO COMMON TRESPASSES.

In complaining of the excessive severity often imputed to the Game-laws, and which is partly due to the circumstance that most of the penalties are cumulative, it must be recollected that poaching is the only kind of trespass to land which is punishable in a summary way, and the penalties annexed to it look all the more severe and arbitrary from the nakedness of the law in the surrounding departments. Poaching is nothing but a common trespass on land, with a flavour of game in it. Unless the trespasser be found to be in search of game, he is practically not the reach of interference, if he keep

out of the Vagrant Act, and the Malicious Injuries Act, for mere walking is no malicious injury to land. It is true that the owner of the land can bring an action at law, and can push the trespasser off the land if he is strong enough to do so, but he cannot seize him and give him into custody. As already stated, an action at law has no terrors for the class of persons most addicted to trespassing on lands. The result therefore is, that any sturdy labourer or idler who chooses may trespass at will on my property—he may enjoy his stroll over the grounds—admire the scenery—trample the lawn, and even stare rudely in upon the details of the family dinner, and there is at present no summary means of getting rid of the nuisance. It is surprising indeed how meekly the landed proprietors and tenants of the kingdom have so long borne with this unprotected state of their privacy. It can only be because the lower classes are not fully aware of the full extent of their power of annoying in this way an obnoxious proprietor, that the obstinacy of their trespasses has so seldom provoked the public notice, and called for some more summary means of punishment, especially when they have been warned that their company is disagreeable. They manage this matter much better in Scotland, where a cheap and prompt interdict or injunction can be obtained from the local court, and is found satisfactory.

SYMPATHY FOR POACHERS.

The opponents of the Game-laws often assume much concern for the poacher, and pity the sad misfortunes which an occasional lapse into a field in search of a hare or rabbit brings in its train, involving, as it generally does, his family in ruin. It is true that a first offence should always be treated leniently, and Justices may well have larger dispensing powers, so as to relax the penalties in such a case; but when poaching becomes habitual, this sympathy seems greatly misplaced. The habitual poacher, it will generally be found, is a person with a turn for idleness and desultory employments, which is quite incompatible with the pursuit of honest and steady labour. He is strongly tainted with com-

sm, and boasts that game is a gift of providence, intended for the poor as well as rich. He affects a taste for nature, and doubt loves his stroll, but loves its illicit pleasures more. Under his plausible exterior is generally concealed an indolent disposition, an aversion to steady labour, and a taste for luxuries and amusements far above his fortunes. If he persists in invading his neighbour's territories in pursuit of windfalls, by usurping the natural perquisites of his neighbour's soil, he is surely not to be pitied if he meets the punishment which the Legislature has awarded to such trespassers. It is a chief object of civilization to enable property to be enjoyed as absolutely and exclusively as is consistent with the public good; and the hunter, however much he may boast of his right by the law of nature, has not even the right of a right for his malpractices under the laws of civilization.

GAME LICENSES.

The game license, which is requisite to enable the game to be killed in the United Kingdom, is quite distinct from the other provisions of the Game-laws. It is nothing more than a contribution to the revenue levied from those who have a turn for sport, and who are presumed to be not unwilling to pay a small annual sum for the liberty of enjoying their amusement unmolested. This is nothing but a fair equivalent for the great trouble the Legislature has taken in protecting sport which is peculiarly, however unjustifiable to invasion. The game license, as it is still called in Ireland, the game duty, being merely a duty paid to the revenue for permission to shoot and kill game on one's own land, and also anywhere else where the proper permission is obtained, does in any way interfere with the rights of others under the law of trespass. It gives no protection whatever against the penalties incurred by trespassing upon another's land. The offences of shooting without a license and trespassing in order to shoot, are quite distinct. *The license does not frank the sportsman beyond his own domain;—and whether licensed or unlicensed, all alike may be convicted*

of the offence of illegal trespass, or of poaching, though poaching is generally applied only to those who are unlicensed trespassers. Formerly the liberty to sport was considered so exclusively the amusement of gentlemen, that certain tests of gentlemanhood, called a qualification, were laid down by the Legislature, so as to prevent plebeians, who were not so qualified, from indulging in it. But all qualifications in England are now abolished, though they still flourish in Scotland and Ireland in their original deformity. Now, ANY PERSON WHO CAN AFFORD TO PAY £2 OR £3 FOR A LICENSE IS ENTITLED TO SHOOT WHENEVER HE CAN OBTAIN PERMISSION FROM THE OWNER OF THE SHOOTINGS FOR THAT PURPOSE.

REPORT OF HOUSE OF COMMONS ON GAME-LAWS.

It may be useful before concluding to state here the result of the inquiry instituted in 1845-6 by a Select Committee of the House of Commons into the operation of the Game-laws. This is the last and fullest Parliamentary report on the subject, and an elaborate and exhaustive examination so far as relates to England was then carried out.

RECOMMENDATIONS OF COMMITTEE.

The select committee in question reported that the Game-laws should be maintained in their present state with the following alterations:—That cumulative penalties for poaching should be abolished; that the penalty of £20 for sporting without a license is excessive; that the space of three days, allowed by 1 and 2 Will. IV., c. 32, s. 44, for giving notice of appeal against summary convictions, is too short; that half of the penalty should not be given to the informer as ordered by 5 and 6 Will. IV., c. 20; that no person convicted of night poaching should be liable to transportation, or to find sureties; that every owner or occupier of land should be entitled to kill the game on that land without any game license; that power should be given to constables to search public-houses and beer-houses for poached game; that feathered game should not be saleable till the second day of the shooting season; that the te

should be entitled to pecuniary compensation for damage done by the game being reserved to the landlord. But the Report added, that to allow an action to be brought by neighbouring occupiers, generally for damage done by game, is not advisable, for it would be impossible to ascertain and apportion the damages done by the game of the several owners respectively.

MR BRIGHT'S CONDEMNATION OF THE
GAME-LAWS.

The Report proposed by Mr Bright to be adopted by the same committee, but which was rejected in favour of that which has been mentioned, contains an able and elaborate indictment against the whole policy of the Game-laws, and recommends their total abolition, on the following grounds :—"That it is impossible to get the labouring classes to look upon poaching as a moral offence; they consider game sent by Providence for the poor as well as the rich; the swarming of game in the preserves thus offers an irresistible temptation to the poor man. Yet, when a labourer is now convicted of poaching, he is a proscribed man, can seldom get employment, and never recovers his character. The best labourers are absorbed in the useless and idle occupation of gamekeepers, and the number of keepers and watchers is so great, that a poor man cannot take a walk in the woods or fields without being stopped and questioned as to his motives. The preserving mania diverts landowners from giving their attention to the improvement of their estates. It also leads to frequent misunderstandings and irritation between landlord and tenant, for the gamekeepers are always prying about the farm, listening to every shot fired, and themselves shooting valuable dogs and cats belonging to the neighbours. The game also causes extensive destruction of agricultural produce, and is a serious impediment to good farming, for it is calculated that four or five hares eat as much as one sheep. The Game-laws, although the severest in the statute

book, have not been able to repress poaching, and not only are the laws severe, but the magistrates who administer them are themselves great preservers, and are considered by the poacher as partial, and animated with a common sentiment of hostility against him. In short, in all ages the Game-laws have been regarded as conferring an unjust and odious privilege for the mere amusement of landed proprietors."

DEFENCE OF THE GAME-LAWS.

On the other hand, it is answered that the Game-laws form a great inducement for country gentlemen to reside on their estates, which is an acknowledged benefit to the locality. Though game is not in the strict sense property, still it can only be got at by others than the owner of the lands, through the medium of a trespass. A trespass is a wrong, for a man's field is as much his exclusive property as his house, and trespassers ought not to be allowed to deprive an owner of any advantage attaching to the exclusive possession of his land. The Game-laws form the only just and efficient mode of protecting the owner's rights from invasion, and securing to him what is an acknowledged characteristic of property, the sole and exclusive use and control of it. Thus, it is nothing but an unjustifiable covetousness of the perquisites of another's property to pursue game without the legal right. Game is not necessary as an article of food to the labourer, and the steadiest and most exemplary workmen pass to their graves without ever tasting its flavour. In short, the poacher is no more entitled to invade my woods and carry off a pheasant on the plea that it was meant for the poor as well as the rich, than he is entitled to rob my orchard of its apples and other kindly fruits, which were equally and in no other sense meant for his benefit. The pursuit of luxury and amusement must always be subordinate to the rights of property; and the poor as well as the rich must learn to accommodate their habits to this maxim.

ON SHELTER AS AFFECTING AGRICULTURE.

BY MR WM. GILCHRIST, CLUNY CASTLE.

THE providing of shelter has generally been considered an arboricultural subject and a landlord's improvement, and what attention it has received has generally been from proprietors or estate managers; but, it is both an arboricultural subject and a landlord's improvement, that is no reason why it should be neglected by practical agriculturists.

In noticing this subject it will be well to keep in view the advantages that agriculture derives from shelter, its *alleged* disadvantages, and the method of providing permanent shelter, that it may be a benefit to agriculture, an ornament to the country, and a source of revenue to the proprietors of waste and barren land.

Shelter is of great value to the growth and improvement of live stock, a fact that proprietors of grass parks seem to be fully aware of; if the grass parks chance to be well wooded, the fact is announced by advertisements in the most glowing terms. Good shelter at all seasons is admitted to be essential to a considerable portion of the produce of cattle, and if such is the case, it is of almost importance to the farmers of this district, where so much depends upon the production of live stock.

During the summer of 1868, the pastures were so bare that many people thought that their herds would perish, or at least be reduced to skeletons. In a very few instances such was not the case, and the condition in which cattle continued for so long a period to keep, and some of them to gain, was a marvel to those who observed the small amount of food they could then procure. The heat that season was greater than it had been for a number of years previous, and the high temperature, more than anything else, kept cattle in such good condition during that period.

Cattle consume more grass during the first and the latter part of the grazing season than they do during the height of summer; and if feeding cattle are left out too long at the end of the season, they lose condition. What makes them lose condition is not the want of food, but the want of heat or shelter, for, if the temperature is low, and the situation unsheltered, there is just the more carbon of the food required to maintain animal heat. In a cold stormy day, which is no uncommon thing at all periods of the grazing season, the cattle may be seen, in unsheltered parks, standing shivering and cowering beside the smallest object that offers any shelter, they are so cold that they can neither rest nor seek for food, and the natural consequence is a loss of condition with feeding cattle, and a reduction of produce with dairy cows. Where shelter is provided, the opposite is the case, as the cattle seek out the shelter, and eat or rest as they require—a striking contrast to their neighbours in the unsheltered park. Under the influence of shelter, the breed of cattle is improved; they fatten more readily and more equally; the produce of dairy cows is increased; and many of the diseases to which our herds are so liable are prevented.

Shelter is also beneficial to sheep, and sheep farmers in exposed districts are often obliged to construct temporary shelter during the lambing season. The most beneficial results, both to ewes and lambs, have been obtained by the erection of *temporary* shelter fences. One instance in particular is worthy of notice, where, before the erection of temporary shelter fences, the death-rate amongst the ewes after lambing was something extraordinary; and, after the shelter was provided, only one ewe out of a flock of 90 died. Both professional and practical men allowed that it was the shelter that produced the change. Shelter affects both the form and the wool of

sheep, as may be seen in the great difference that exists among the same breeds in sheltered and unsheltered situations. In the latter, the wool is harsh and unequal; while in the former, the opposite is the case. Plantations are a favourite resort for sheep during a snow-storm, and are considered good and safe shelter.

But if shelter is so great a benefit to our flocks and herds, it is no less beneficial both to grain and green crops. It improves and increases the productiveness of the soil, raises the temperature, produces a larger yield of both straw and grain per acre, as compared with the same quality of land unsheltered. The quality of the grain is improved as well as the quantity. Some of our grain crops suffer very much from being shaken just about the time they are becoming ready for the reaper, and some varieties of oats are more injured from this cause than others. During last harvest, several fields were observed where, from this cause, there was nearly as much corn left on the ground as would have been fair seed to it. It would not be advisable to provide as much shelter as would entirely protect the grain crop, but if a little shelter were provided, the damage done would not be so great.

Green crops generally suffer most from the want of shelter, just about the time they are beginning to take with the ground. In this district, during the season of 1868, the turnip crop suffered severely from wind and drought, from the time of sowing until after they were hoed. Few failures of the crop were observed in sheltered parks, where the other conditions were suitable for the growth of a crop of turnips; but instances could be given where so far as cultivation and manuring could secure a crop it might have been expected, and yet from exposure to the drought and gales, the crop failed. In some cases, the failure was total.

The advantages of shelter for green crops can be overdone, but this seldom occurs. If hedges or trees are planted for shelter, and allowed to get overgrown and encroach too much on the fields, they then become a disadvantage; but this is the fault

of the management, and not of the shelter. Unfortunately, the shelter that prevents the grain crop from being shaken also prevents the drought from getting to it; and in a backward harvest, similar to the past, this is felt to be the greatest disadvantage which can be alleged against shelter. But, on the other hand, grain grown within the influence of shelter becomes earlier ripe, and is thus generally secured without suffering much damage from inclement weather.

It is asserted that shelter belts, trees, and hedges interspersed amongst arable land, are a harbour for small birds, wood pigeons, and game—that their branches shade the soil, and their roots rob it of substances that would be nourishment to the other crops. Small birds are greater friends to the farmer than they generally get credit for. Wood pigeons are a nuisance, but can be kept down at a small cost as compared with the benefits of shelter belts. The sheltering of game is a grievance when indulged in too much. Shallow-rooted trees rob the surface soil; but the deep-rooted varieties derive their nourishment from a lower stratum than is reached by the cultivated crops, and their leaves annually form a manurial substance for the surface. From what has been already stated, it will be observed that plantations, belts, and hedge-rows are considered to be the most suitable for the providing of permanent shelter. It has been said that the formation of plantations in belts ought to go hand in hand with the draining and improving of arable land. Such a rule, however, has not been the case, but the contrary; for, while the improvement ought to be “draining and the formation of plantations for shelter, the practice is, “draining and the destruction of plantations” wherever they can be turned into arable land.

In the formation of plantations or belts for shelter, a great deal depends upon local circumstances. For low-lying or highly cultivated situations, clumps or groups of trees on some of the most prominent parts, or even angular clumps at the corners of fields, may be sufficient; while, for a similar situation, if the soil was poor and uncultivated, a

good mass of wood, say from 5 to 10 or 20 acres, may be required, besides the clumps already mentioned. As the ground rises from the flat to the high, the small clumps or groups should give place to the belts or hedge-row. As a general rule, straight belts are not considered very picturesque objects in the landscape. Their general outline should, therefore, be of a curved or undulating nature, always presenting a bold or convex outline at the exposed parts, and the reverse on the sheltered sides. This is the true shelter formation of nature, as illustrated in the hills and glens of our native country.

In the improvement of waste or barren lands, about a tenth part should be devoted to the growth of trees; and the cultivation of the ground would be greatly facilitated if the shelter belts, &c., were at least eight or ten years old before the ground were cropped. The same rule ought to apply to the reclaiming of land, where a crop of wood has been grown. It is only by the highest forcing with artificial manures that a crop can be procured on reclaimed woodland. A great part of this manure might be saved if shelter was provided, as the seeming sterility of the ground is caused by the sudden change of climate consequent on the cutting down of the wood. Where it is practicable, at least a tenth part of the old wood ought to be left, in such portions and in such positions as would be most useful for the providing of shelter, and the retaining of that humidity in the atmosphere which is so essential to the growth of all vegetable productions. Where this is not practicable, the arrangement of shelter belts, &c., ought to be the first undertaking in the

improvement. In stating that a tenth part of the land ought to be under wood, reference is only made to waste or barren lands on woodlands in high exposed districts.

It may be said that a tenth part of such land is too much to be occupied by trees, and that all the wood that will grow on it will never pay the expenses connected with the planting and management. The marketable value of the wood reared in such situations is only one item in calculating the value of shelter belts or plantations, and the other and principal item is the benefit that the adjacent lands derive from the shelter provided by these shelter belts. In other words, if it is found that shelter belts enhance the rental of the adjacent lands 10 to 15 per cent. (which, under the circumstances, is a very moderate assumption), the said 10 or 15 per cent. ought, in all fairness, to be credited to the value of the belts.

It is difficult to grow wood both for profit and shelter at the same time, unless the breadth of ground under wood is of greater extent than is generally the case with plantations or belts grown for shelter. Trees grown for profit must be grown tall and clear; while trees grown for shelter ought to be low and bushy, well furnished with branches at all periods of their growth. There is no danger of trees grown in that style being blown over with a hurricane.

Where sufficient ground can be spared, it will be most judicious to grow the trees both for shelter and profit; and where this is done, the land that is under the crop of wood will ultimately be found, if all things are fairly calculated, to give more revenue than the arable land.

EARNINGS OF AGRICULTURAL LABOURERS.

THE latest return published with regard to the earnings of agricultural labourers fully confirm what we have previously said, that they are not nearly so ill-off as some would-be philanthropists try to make us believe. Indeed they prove that, taking all things into consideration, they are better off than the unskilled workers in towns. In Wiltshire, we learn that the weekly wages of men range from 10s. to 12s.; women from 4s. to 10s., but the latter sum would seem to be exceptional, and the average might be set down at 7s. Children under sixteen range from 2s. to 5s. By task-work the men can make from 16s. to 18s. In addition to this, beer or cider to the value of 2s. is allowed to men, and 6d. worth each for women and children, in one part of the country; and in another, the daily allowance of drink in harvest is three or four quarts for men, two for women, and two for children. No doubt those bearing "the toil and heat of the day" require something to quench their thirst, and the effects of such stimulant, as in the beer or cider, will, with the labour under a broiling sun, soon be sweated out; but surely two quarts for children are an extravagant allowance. Indeed it is doubtful whether they need such liquor at all. Water would serve as well; and in all cases we opine it would be better to give the worth of the drink in money. Those who wanted such kinds of "refreshers" could then purchase the quantity they wanted, and those who did not care for the beverages could pocket the cash.

Turning to Dorset, we find that the wages for men in this much maligned county have risen since the returns of previous years, the men making from 9s. to 9s. 6d. weekly, and from 15s. to 16s. and 18s. for task-work; women's wages are not so high as in Wiltshire, ranging from 4s. to 6s., or about an average of 5s.; and the average of children's wages which are from 2s. to 5s., will stand

at about 3s. 6d. Shepherds get from 10s. to 12s., with something extra during the anxious season of lambing. Here again we have the drink, which in some districts is considered equivalent in value to £1 in the harvest time, or say 5s. per week; in others it is computed to be worth 1s. per day, and this sum appears to be given in cash, and in addition to three pints of ale. In some quarters there appear to be special advantages. For instance, those who receive part payment in grain can, in the dairy districts, readily exchange it for butter and cheese, which commodities they obtain at a small price. Altogether, the picture of Dorset, as it appears in the light of the dry statistics of this return, is not so ugly as it was. Of course, mere figures like these can never present a full and faithful representation of the life of the people, but they do indicate, to some extent, what that life might be, and shew certainly that their pecuniary state, at least, is better than it was.

In some parts of Devonshire, Axminster for instance, the wages are smaller than in Dorset, being from 8s. to 9s., and at task-work not more than from 9s. to 12s. can be earned. In Okehampton, 11s. to 12s., and in piece-work, from 12s. to 15s. In some parts of the country, women and children are not employed in agricultural labour, save during the few harvest weeks; but where they are so employed, they make about 4s. to 4s. 6d., and children 3s. 6d. weekly; 10d. per day, and meat and drink, is what is given during harvest time. Drink is also given in this county to the extent of from three pints to two quarts per day for men, and a quart each to women and children; but in some districts where cider is allowed, the value of it is deducted from the wages at the end of the week.

The returns from Cornwall are rather meagre, but such as we have give the wages of men at 11s. when employed by the week,

15s. can be earned by task-work, women and children make 4s. 6d. per

Somersetshire, wages for men range from 10 12s., and by piece-work, 14s. to 15s. men make from 4s. to 6s., and children 4s. to 8s. The latter sum will be given those who are near the extreme limit of 10 years of age. They feed well in harvest-time, getting five meals a-day, consisting of oat and potatoes, with bread and cheese, and each man washes down with a gallon of beer, while the women and children are supplied with the like edibles, only, instead of beer, they receive tea as a beverage. The diet is decidedly better, and the practice is to be generally adopted all over the country.

We find, as we naturally expected to do, that the wages of the agricultural labourers are lower in the vicinities of the great manufacturing industry. There is more work for labour, many of those brought up

in the country finding places in factories, and as carters in the towns. Thus in Lancashire and Cheshire, the weekly earnings for men are 15s.; in Yorkshire, 15s. to 18s.; in Northumberland the same; in Cumberland, 15s.; and in Westmoreland, from 14s. to 18s.

It will thus be seen from these figures, which we have summarized from a return issued under Parliamentary sanction, that the agricultural labourer is not so badly off, in a monetary point of view, as was generally believed, and that his condition, after all, does not compare so very badly with that of the same class of urban labourers. Still the wages are small enough, and much might be done to improve his condition in the way of house accommodation. We earnestly hope, that out of the many inquiries which have been made, and are making, that some method will be devised to make the present generation more comfortable and happy, and the rising one more intelligent, more comfortable, and happier still.

IMPORT AND EXPORT OF AGRICULTURAL COMMODITIES.

THE dry figures of the Board of Trade

Returns are at first sight rather repellent to most readers. The eye does not rest on them with pleasure; but, nevertheless, if one gets over the loathing at first sight, and has patience to wade down the long columns, he will find much to instruct and instruct him in his progress. We journeyed down the Return shewing the value of the imports of foreign and colonial produce during the year 1869, and proposed to our readers what we have seen interesting from an agricultural point of view.

Well, then, we find that British consumers last year paid for cattle alone £3,695,295, which is nearly double the sum paid during the year that being £1,970,975. For sheep, the amount handed over to foreigners was

£1,194,982, twice as much as in the year before, which was £506,109; and for lambs, £24,032 was paid, as against £21,055. There was thus for butcher-meat alone disbursed by the Britisher to the foreigner, the tidy little sum of £4,914,309. Now, such facts as these ought to stimulate farmers to the consideration whether it is not possible that the channels of this golden stream might be diverted so as to convey the coin into their own pockets. There can be no doubt that our country is well adapted for the rearing and feeding of cattle and sheep, and it is likewise certain that our land at present does not carry the number of stock that it is capable of doing under an improved system of husbandry. Five millions sterling per annum is a large prize to contend for, and should call forth

all the skill and energy of British agriculturists.

Turning now to corn, we find that the sum paid for wheat last year was less than in 1868; but, although money value is smaller, the quantity would be as large. The total sum was £19,515,758, as against £22,069,353 in the preceding year. For barley we paid £3,379,775; for oats, £3,340,494; peas, £455,142; beans, £832,412; Indian corn, £5,935,655; and for wheatmeal and flour, £3,792,939 — giving a grand total of £37,222,175. But this is not all that British consumers paid to foreign growers for the belly alone. For butter, £6,923,210 was paid; for cheese, £3,083,850; eggs, £1,126,823; and for bacon and hams, £2,432,260; for other kinds of meat, £1,229,547; and for fish and lard, £1,407,698. Adding these to the sums expended upon live animals and corn, we get an aggregate of £57,339,872 paid last year by the people of the British Isles for eatables alone. The magnitude of these figures, taken in conjunction with our own produce, is something astounding. But what we think they ought specially to teach is, that British farmers, instead of Continental and Colonial ones, should themselves operate upon this magnificent cash account. We have not included tallow in the above sum, for which we paid £2,770,285, which would bring up the total to upwards of sixty millions. To raise our home produce we laid out £2,640,983 for guano; for oil-seed cakes, £1,361,580; for flax seed and linseed, £3,646,685; and for foreign hops, £1,098,317.

Looking now to what we may call the expenditure on our backs, on commodities that might be grown in this country, we find that we imported £4,179,502 worth of flax; hemp, £1,940,275; and of wool, £14,299,336. Of course a large return would be received for the manufactured articles of these substances when exported. All these figures refer to the imports during last year.

We shall now glance at the imports and exports for the month ending January of this year. the latest return which has been

published. From the Board of Trade tables we find that there were 11,360 of the bovine tribe entered our ports, as against 9578 in the corresponding month of 1869; 1243 calves, as compared with 796; 30,391 sheep, where only 10,160 came in the same period last year; and 8246 swine, in comparison with 1843. That is, there was about one-fifth more cattle, fully two-fifths more calves, three times as many sheep, and more than four times as many swine. These facts shew that our Continental neighbours are rapidly stealing a march upon us, even in that department of agriculture in which we should excel them. Of wheat, we imported in January 2,910,167 cwts., as against 2,614,142 in the like period of last year, the increase being entirely from the United States. There was a falling off in the receipts of barley to the extent of about half a million of cwts., the quantities being for last January, 649,838 cwts., and for the same month in 1869, 1,168,099 cwts. Of oats we received, in round numbers, 200,000 more cwts. than in the first month of 1869; the respective quantities being 713,218 and 502,283 cwts. There was little difference in the importation of peas—125,321 cwts. in January '69, and 126,616 in the same month this year. We have nearly 100,000 cwts. less beans—134,568 cwts., as against 231,198. In Indian corn there was likewise a falling off, more than 200,000 cwts.—1,176,959 to compare with 1,388,306. In wheatmeal and flour we had an increase—502,520 cwts., as against 401,528 in the corresponding month of 1869. Little more than the fourth of the potatoes imported in January of last year were imported this, no doubt owing to the fact that the abundance of the home crop, and the consequent smallness of prices, made it unprofitable for growers abroad to send them. The figures are for the first month of this year, 33,863, to compare with 112,978 cwts. in the same time last. In the imports of butter there was a slight falling off, an increase in cheese, a decrease in eggs, an increase in lard, a diminution in hams, but a large augmentation in fresh beef and pork, as the fol-

lowing statistics arranged under the general head "Provisions" shew:—

		1869.	1870.
Butter .	cwts.	59,462	50,393
Cheese .	"	15,391	19,593
Eggs .	number	19,807,320	14,908,680
Fish, cured or salted	cwts.	1,743	55,778
Lard .	"	1,643	8,142
Meat, fresh or slightly salted			
— Beef .	cwts.	39	1,183
Pork .	"	6	3,239
Meat, salted—Bacon			
and Hams	"	11,973	6,790
Beef, salted	"	994	1,472
Pork .	"	4,728	6,696
Meat, not otherwise described	"	2,534	2,860

From the diminution in the import of eggs we draw the inference, which we trust may turn out, as shewn by monthly succeeding figures, to be the correct one, that more attention to poultry is being paid by our hen-wives at home. There cannot be a doubt that, when well looked after, hens, both as producers of food for the matutinal and the dinner meals, are a profitable adjunct to the farmer. Of seed of an agricultural interest in this country we imported the following:—Oil-seed cakes, 4618 tons, in comparison with 3803 tons the preceding January; of cotton seed, which it is probable would mostly be used in the manufacture of feeding stuffs for cattle, a less quantity, by 400 tons, than in the corresponding January of 1869; clover seed, 15,782 cwt., as against 11,201; flax seed and linseed, 35,985 qrs., in comparison with 39,304; and of rape, 8870 qrs., to be set alongside of 2484 qrs., in the first month of the preceding year. We last month imported nearly twice as much wool as in the same month of 1869, viz., 8,861,886 lb., as compared with 4,645,286 lb. It is right to premise here, however, that this may be no good datum upon which to found a calculation as to the increase that will take place in the year; for exceptional circumstances, such as an early shipment or a speedy voyage,

will materially increase or diminish, as the case may be, the returns in any one month. Of flax, we received in January 120,623 cwts., as against 49,317 cwts; hemp, 13,723, as compared with 18,575 cwts.; hides, 12,349, to be set beside 5996 cwts.; 6397 cwts. of hops, to compare with 14,952; and 44,153 cwts. of tallow, as against 11,345 in the respective periods.

With regard to manurial substances, we notice a large increase in the importation of bones, 4592 tons; whereas in January last year the quantity was only 1858. Of brimstone, which also mingles in artificial manures, there was also a large augmentation; 40,244 cwts., as against 16,076; and of guano, we landed 2154 tons, half from Peru, to be compared with 254 tons last year. Some of these articles enumerated were re-exported, but not in any quantity.

Now, to set against this formidable array of imports, we exported in January last the following articles of home production:—Bacon and hams, 1207 cwts., as compared with 1578 in the corresponding month of 1869; beef and pork, 619 cwts., as against 391; butter, 3556 cwts.; and cheese, 2009 cwts.; in the former case 376 cwts., and in the latter 523 cwts. more than in the first month of last year. We exported 47 horses at an average of about 50 guineas each, and 407,423 lb. of wool, as against 698,970 lb. in the same period the year before. These items, we think, exhaust the list of home-grown raw produce sent abroad; which is a beggarly array in comparison to those brought in. But it is no unhealthy sign of the prosperity of the country generally, that we can thus command the markets of the world; and all that we had in view in quarrying out these agricultural facts from the mine in which it may be said they almost lie buried, was to shew that British farmers have a large scope for the exercise of skill and enterprize.

CAN THOMSON'S ROAD STEAMER "SPEED THE PLOUGH?"

WE have learned to know the value of traction-engines upon the rail; we have also seen the practicability of adopting some of the best forms of them upon the road; and we are now discussing the propriety of introducing them, in travelling form, upon the field. Of course, certain wiseacres have a certain amount of foregone conclusions conjured up in their minds, that nothing short of ocular demonstration, and not even that, would convince them of error; but facts are stubborn things to get over, and it is worth while marshalling them to judge of their importance, both present and prospective. If these facts point—as we are verily well impressed—not only to the possibility but the practicability of employing a travelling engine to do the work of cultivating the land as economically and well as the best forms of stationary engines, or rather engines moving along at the land's end, then we opine a case has been made out to command the ear and attention of our readers.

What are the facts referred to? They are these:—That Mr Thomson, C.E., Edinburgh, has constructed an engine, with its accessories, capable of travelling over any ground required. It matters not whether it be a rough road newly laid with broken flint or whinstone, or a well macadamized promenade; a steep gradient, or a slight incline; the shingly beach, or the sandy desert place, with holes and knolls uncomfortable enough to the foot promenader; the beaten headland, or the ploughed field—away it goes with an ease and a “will” that is perfectly astounding, and the traces left behind this snorting giant, of at least 6 tons weight, is about as imperceptible as if a garden roller had been passed over the surface; and all this too, be it observed, with a load of more or less weight to draw. But in order to place our assertions beyond the region of doubt, and elevate them to hard facts, we have been at pains to ascertain them. We find that an 8-horse-power

steamer drew 32 tons weight a distance of 8 miles, where there were rising gradients of 1 in 16, where it occasionally had to pass over newly laid “road metal,” and that, too, without apparently crushing the stones with its own weight. It was made to run over the sands of Portobello, near Edinburgh, below high-water mark, when they were fully charged with moisture, as well as when they were loose and drifting before the breeze. It also crossed a field of soft grass, and a trenched paddock, with less indentation than the foot of a human being; and its feat as an agricultural-traction engine, with two double ploughs at its tail, before at least a thousand spectators, on the trial ground of the last meeting of the Highland and Agricultural Society, must be fresh in the recollection of our readers.

All this is accomplished owing to a beautiful and ingenious contrivance—the wrapping or muffling up of the ordinary wheels in a greatcoat of vulcanized india-rubber. To reduce friction to a minimum, they are formed upon a broad basis, not less than 12 inches in width, and from 5 inches upwards in thickness. In this muffling of elasticity lies the grand secret of what might be called almost motion without gravitation—motion at least reduced to the minimum of friction by the almost total, and difficult to be explained, absence of downward pressure. It is so remarkable in this respect that we can afford to excuse an incredulous journalist who possibly has never seen it employed at any kind of work. But why need the people be so much surprised—why treat its chronicled actions with incredulity? The ponderous hoofs of the elephant, that would crush a man as the latter would a reptile, pass over bogs, and morasses, and jungles with ease, and leave very faintly the impress. The same elasticity is aped in a marked degree with these india-rubber tires, of course without the investiture of the power of will to harm; and what would suffer under

the feet of a human being escapes unscathed under the influence of what our American cousins would call the "almighty" preservation of a body of vulcanized india-rubber. Such is Professor Archer's view in a paper read before the British Association; and the trials warrant such apparently paradoxical conclusions. When such destructible articles as potatoes and carrots are passed over as unharmed as a huge boulder, and without perceptible jolting, the invention, simple as it seems, must be looked upon as one of the very foremost of the present wonderful age.

Our contemporary, in meddling with the position which we were entitled to assume, even from probabilities, has only landed into an inextricable muddle. While admitting all its capacity for work as a road steamer, it disbelieves everything else. It cannot open its eyes wide enough to see that what is practicable on bad roads is practicable at least on good fields. If a ponderous engine of 8 tons weight refuses to crush a carrot or a potato, and rises over the difficulty, surely, by a parity of reasoning, it is good enough to go over the ordinary runs of agricultural holdings, where general steam-ploughing has been carried on. There can be no half ways of believing. One must either make up his mind to deny the power ascribed to the tires altogether, or, if not admitting them, wait for proof as a declarator, and not rush into print with vague generalities. But what does our contemporary mean while averring that "when subjecting Mr Fowler's balance-plough to dynamometrical tests, near Swindon, some years ago, we were struck with the mischievous effect of the broad-wheel track of their plough weighing about 27 cwt?" Does our contemporary instruct its readers that the draught of the 4-furrow plough was 27 cwt., as gauged by the dynamometer; or does it convey that the actual weight of the plough was that sum in cwts.? If our former rendering of the clause be correct, then the "weighing" is a *lapsus calami*; if the latter, why introduce the dynamometer at all? for we always considered it more a measuring than a weighing instrument. Moreover, the instancing of a broad wheel, unmuffled, in comparison

with a wheel covered with the elastic material, that renders Thomson's patent most valuable, and speaking of its mischievous effects, is a gratuitous piece of pleading not at all touching the merits of the point at issue.

Looking to the cumulative evidence of the various trials, and to its operations in swamps and meadows, in grass land and in fallow, we have no loop-hole of escape to doubt or distrust its operative powers as a plough engine. If it can be made to draw two double ploughs 8 inches deep in a retentive soil, with ease and alacrity, it can also be made to plough these, with a little additional power, 10 or 12 inches deep. All that it has to contend against seems to be only its own weight, and the traction necessary for the ploughs in their digging work. To argue upon the premises that its indurating effect is on a similar basis to an ordinary traction-engine without these india-rubber tires, is only shewing an imperfect acquaintance with, or an inconsiderable opposition to, a powerful agent for accelerating not only cultivation, but general farm work. Running, as it does, wholly on the unploughed land, and leaving only the mark, as an eminent engineer puts it, of an ordinary garden roller behind it, the land is not consolidated to be injuriously affected, and the stirring process of the ploughs behind is quite as uniform in body or bulk, and quite as regular over the surface, as the best efforts of ordinary steam ploughing. True, there have been no lengthened trial as to its capacity for taking the field as a traction-power to any cultivator; but with the evidence before us of what might be called the versatility of its powers, where obstacles intervened that seemed almost insurmountable, we are justified in directing the attention of agriculturists towards it.

Having thus touched upon its efficiency for farm work, it remains to be seen how it will stand in the eyes of the speculative in the paramount matter of cost. A 6-horse-power engine of Thomson's, which seems powerful enough for two double ploughs—at least it has drawn these with furrows each 8 inches in depth—is priced at £600. Add to this the price of the ploughs, which will not exceed £30 additional, and then the yoke or

tackling will not cost above £10 more—in all £640. In comparison to this take the direct (and best existing) system of Fowler. Take his 8-horse-power engine, which, by the way, is only recommended for triple ploughs, and we find the aggregate cost of engine, clip-drum, plough, and tackling, with additional item for change of speed, costs at least £700. But Fowler would never recommend such a small horse-power engine with suitable tackling for steam ploughing generally as totally unfit for deep cultivation. Neither would we recommend a 6-horse-power engine, even with the improved tires, for this kind of work, but from a belief that it is only nominally so. The extraordinary steam-generating power of the copper boiler attached has much to do with the staying powers of the engine, so that while nominally a 6-horse-power, it may occasionally be working at 12-horse-power. That it can do this with ease, with even the furnace door open, we have the testimony of Major Skinner, Mr Brown, Mr Abernethy, Mr Gray, and others, that even under what would be considered a heavy pull it was not pushed to its maximum power.

But what additionally recommends it to our

notice is, that it can be rendered about the handiest agent conceivable on a farm for any kind of traction work. Indeed, by that standard, and that alone, it would soon recoup first cost in economizing the use, and consequently saving the keep, of horses. To farmers of capital, who farm their hundreds of acres, the consideration of employing an agent of this kind must take a practical form in the course of time. It may not supersede or displace either Messrs Fowler or Howard's cultivators, but, depend upon it, it will prove a dangerous rival. The tear and wear of tackling, either direct or roundabout, is an important item of annual expenditure; and then the time occupied in shifting and laying down tackle may be reckoned at one day per week. If all this can be reduced to a minimum, if the number of hands necessary for general steam work can be lessened, and then the engine run home to coal and to water, and do all other sorts of things as expeditiously as a team of horses, to say the least of it, its importance upon the future of agricultural prosperity, in having a tendency to increase production, while it minimizes cost, can scarcely be over-estimated.

THE POLLUTION OF RIVERS.

WE have been favoured with Volume I. of the First Report of the Commissioners appointed to inquire into the best means of preventing the Pollution of Rivers. The Commissioners are Sir W. T. Denison, C.B.; Dr Edward Frankland; and Mr John Chalmers Morton, editor of the *Agricultural Gazette*. The report is a most voluminous one, and is thoroughly exhaustive; but as it only reached a few days since, we must defer, until a future opportunity, a detailed examination. Although the Report is ostensibly confined to the Mersey and Ribble basins, the manner in which the Commissioners have carried on their inquiry renders the Report of general

interest, not only to those concerned in preventing the pollution of our rivers, but to the advocates of the utilization of the sewage of towns. Part I. treats of River Pollution, under the heads, of (1) pollution by sewage, and suggested remedies, and (2) pollution by manufacturing refuse, and the remedies proposed for the purification of such refuse. Part II. is devoted to Water Supply, and the condition of the principal rivers from which supplies are drawn.

We give below an extract from Part I., on the causes of the Pollution of Water.

Pollution of Water.—It is stated broadly and generally by every person who has given

evidence on the subject, that the rivers (except close to their sources) are polluted and filthy, and that they are now in a worse condition than they used to be. The recollection of many people on every stream goes back to a time when they were in the habit of fishing where no fish can now exist. The fact, so full of significance as regards the importance of the manufactures carried on in these basins, that between the years 1831 and 1861 the population increased from 1,578,370 to 2,796,964, will of itself go far to account for the changed state of things.

The water issues from the hill-side clear and bright. Even where the sources are taken up for the supply of towns lower down the stream, the "compensation water," which is allowed to flow down the original water-course, comes to the first manufacturer who has works on the stream in a satisfactory condition. He gets for his purposes, whatever they may be, that which the people in the towns are glad to apply to domestic use. But in what state does this water pass away from his works? If it has been used merely as power, it has passed over the mill-wheel without receiving any injury; but if, as is generally the case, it is taken up, because it is pure and clean, by dyers, paper makers, or others who require such water, it issues at the tail of the works polluted in various ways; and a reference to the evidence of the different firms (vol. ii., "Minutes of Evidence," part 2), and to the previous description of the state of the Irwell, will shew that it passes down the stream to those below in every instance virtually unfiltered. Occasionally we have found an attempt made to strain it through coarse canvas, or to allow the more solid portions of the refuse to settle for a time in a tank; but the great majority of those who use the water allow it to pass away without any attempt to free it from the matters with which it may have got mixed upon their premises, whether such matters be innocent or noxious. In some instances, as in the case of the alkali works, a portion of the muriatic acid, which formerly issued into the air in the shape of gas, is now, in conformity with the

Alkali Act, condensed by water, and passes into the stream, where it meets with the drainage from soda-waste, forming a most noxious and offensive liquid, destructive to vegetable life; in many cases, arsenic gets mixed with the water; in all, except when the water is used merely as a source of power, there is an addition, as we shall shew more in detail hereafter, of some extraneous matter more or less offensive to the senses, rendering the water useless, without previous purification, to those lower down the stream.

Having passed sundry manufacturing establishments, and been enlarged by the junction of brooks, the stream becomes of some importance, and a town is built upon its banks. What account do the various municipal bodies give of the state of the stream as it comes to them? They all complain that the water is polluted by sewage, as well as by every species of manufacturing refuse; that it is most offensive to the sight and smell; that it is unfit for use; that even when used for steam-engines it clogs up the boilers, and is injurious to the machinery. Many are of opinion that the streams in this state are directly injurious to health; be that, however, as it may, all pour every kind of refuse into the stream and convert it into a common sewer. Some, ~~under~~ the idea that by mixing ashes with human excreta they will obtain a sale for the former, and thus get rid of two evils at once, object to the use of water-closets, and insist upon the superiority of privies and ash-pits; but all pass a large quantity of putrescent excrementitious matter into the sewers, and empty these ~~sewers into the streams~~. Even the manufacturers, who complain of the sewage of towns as that which is most injurious and offensive, do themselves, very generally, pass the excrements of their workmen into the stream without any hesitation.

The effect of this conversion of the rivers into common sewers is most injurious. All complain; even those who, while suffering from the inconvenience and annoyance which such a state of things entails, add to the nuisance by themselves following the general example; while they whose property happens

to lie on the stream, even many miles below the towns, are sufferers in a variety of ways. Are they farmers? Their cattle cannot drink of the stream passing through their meadows. Are they dwelling on or near the bank of the river? They are driven from home by the stench, which renders the place unbearable. Are they compelled by duty to remain on the spot? They are subject to perpetual annoyance, and, as alleged, in many instances to ill-health. Have they property? Its value is often diminished; a house remains tenantless; land is unsaleable, except at a reduced price. Of all these evils, instances will be found in the volume of evidence appended to this Report.

Silting up.—Collections of rubbish, cinders, and other solid refuse are habitually thrown into the rivers. When the fall is rapid, the ordinary flow of the water is sufficient to carry down a good deal of this refuse; but it finds a resting-place at the back of weirs, or wherever there is any check to the velocity of the stream; and the result almost everywhere is a steady rise in the river bed. Where the slope is small, the practice is to take advantage of every flood, to open the sluices of the lodges, and of all places where silt or mud collects, and to allow the water to carry all this down to the lower reaches of the river.

In the towns, of late, the municipal authorities have exerted themselves in many instances to check the tendency to make the bed of the river the depository of every kind of solid refuse; but they complain that a flood is sure to leave behind it traces of the malpractices of people above them, in the shape of banks of rubbish, cinders, &c.; and as their authority does not extend beyond the municipal boundaries, they have no power to impose any check upon such practices. The millowners and others on the streams complain very generally of this "silting up," and in many instances deprecate the practice of throwing solid refuse into the streams; still, however, the practice prevails very generally, and several admit that they do make use of the river as the general scavenger.

A good deal of blame is generally cast upon

weirs as being the chief cause of silting up. Of course a weir, by creating a still pool, gives a resting-place to all that is brought down the stream; and in the present state of the streams weirs are a nuisance, for the ponds above them are filled with every species of pollution; but if the river above were kept clean this nuisance would be abated. The evil of this kind arising out of the weirs would therefore have been trifling had not the people on the stream above constantly made use of the latter as a depository for refuse.

It must not be forgotten, however, that considerable mischief of another kind is sometimes done by weirs. Wherever one is built, in a sluggish river for navigation uses, or in a more rapid stream for storage purposes or power, the water thus dammed up hinders the drainage of lands lying near the level to which it is raised. No doubt this is an inconsiderable thing wherever land is valuable for building on, because the cost of carrying its drainage, however far, by a conduit issuing below the weir is then a comparatively small tax upon its value. But in a purely agricultural district the injury, by hindering land drainage, done by weirs for the sake of mills and canals or river navigation is not unfrequently very serious, diminishing in a great degree the annual value of considerable areas of land. No examples of this kind of any importance in Lancashire have, however, been pointed out to us. Neither have we seen any examples of the use of river water for the purposes of irrigation by which a valuable agricultural result of weirs is elsewhere occasionally obtained.

Chemical difference between Polluted and Unpolluted Water.—Absolutely pure water is not to be found in nature. Even at the moment of its condensation in the atmosphere from invisible vapour to visible cloud, water absorbs gases, and becomes also contaminated with a fine dust which is everywhere floating in the air. When it falls to the earth as rain, it percolates through strata or flows over surfaces more or less soluble, and dissolves, according to circumstances, quantities of solid matter, varying generally from about 3 lb. to

in 100,000 lb. of water. In addition to these inevitable impurities, natural and undisturbed water is not unfrequently turbid from blebby substances suspended therein in a divided condition.

The following are the chief characteristics of polluted water:—It is tasteless and inodorous, possesses a neutral or faintly alkaline reaction, rarely contains in 100,000 lb. more than $\frac{1}{2}$ lb. of carbon and 1-10th lb. of nitrogen in the form of organic matter, and is liable to putrefaction, even when kept for time in close vessels at a summer temperature.

Among the different kinds of pollution affecting water, animal organic matter, as it occurs in sewage, is that which renders water not only offensive to the senses, but most likely to be injurious to health both by its gaseous emanations and by its deleterious effects when used as a beverage. Rivers so polluted frequently contain from 1 lb. to more than 2 lb. of organic matter in 100,000 lb. of water, and from $\frac{1}{3}$ lb. to $\frac{3}{4}$ lb. of organic carbon in 100,000 lb. of water. Pollution by vegetable organic matter, such as that caused by effluents from print works, stands next as regards offensiveness; water so polluted being extremely unpleasant, not only to the sight, but in warm weather, to the sense of smell. Sewage water contains in 100,000 lb. twice as much organic carbon as is present in water polluted by sewage, but owing to the comparatively small proportion of nitrogen in vegetable substances, it rarely contains more than $\frac{1}{3}$ lb. of organic carbon and $\frac{1}{10}$ lb. of nitrogen. Chemical works contribute to water extreme hardness and other objectionable, and even poisonous, properties.

POLLUTION BY SEWAGE.

We have already stated that of all the kinds of pollution to which rivers are subject, pollution from sewage is the most objectionable; although the contamination of the Mersey and Ribble from this source is often exaggerated and overborne by the foul contributions of manufactories, still in many of the tributaries to these rivers, such, for instance, as the Darwen below Blackburn, the Chor-

ley below Chorley, and the Tonge below Bolton, and even the Irwell below Manchester, a large proportion of the sum total of pollution is of this character; and the evil is rapidly increasing, owing to the increase of population, and to the more complete system of sewerage, which sanitary considerations are compelling most of the towns of these basins to adopt.

Comparison of the privy and water-closet system.

—In the towns and villages of this district the midden or ash-pit system prevails, and water-closets are the exception. The alternative of water-closet or privy as the machinery for removing human excrement from dwelling-houses necessarily comes within the scope of our inquiry. It is, indeed, forced upon the attention in South Lancashire by the different views regarding it which have been maintained and carried out by the authorities of the two chief towns of the county. In Liverpool, the corporation are rapidly converting privies into water-closets; they have already thus displaced 13,229 during the past six years, at a cost of £37,719; and they forbid the erection of privies in connexion with all new dwelling-houses. In Manchester, on the other hand, the municipal authorities strongly insist upon the superiority of the privy; and, indeed, when applying for their Waterworks Bill they sought for power to make a charge of one guinea per annum for the first water-closet in a house, a sum which would obviously have prohibited the use of water-closets in all houses below a certain class.

The defence of the privy, as the better arrangement of the two, is confidently urged, and is not without its plausibility. Watertight tanks or cesspools at a little distance from the dwellings, one to every household, which shall receive the whole solid and liquid excrement, to be there covered daily with the ash-waste of the house fires, and thus kept so dry that foul affluvia will be hindered:—These, it is declared, can dirty neither soil, nor air, nor stream. The subsoil and standing ground of the dwelling-houses cannot, it is alleged, be fouled by them, the air will not

be made offensive, the river will not be polluted ; and the contents of these tanks cleaned out periodically must place the whole excrement of the population at the disposal of the agriculturist. On the other hand, the water-closet, draining immediately into a sewer and thence into the nearest natural watercourse, washes all this valuable matter, as quickly and completely as possible, clean away—a wholesome arrangement possibly, but a wasteful one ; and, moreover, one which makes a direct and most serious addition to the pollutions of the river. Such is the case put by the defenders of the privy system.

The marked distinction between the two methods which is thus asserted disappears, however, when we inquire into their practical working. The privy system is in reality both wasteful and offensive. Neither the cesspool nor the ash-pit is water-tight, and their liquid contents soak into the land around them. Sewers are necessary whether water-closets exist or not ; and chamber slops, with most of the liquid excrement and other house drainage, find their way into them notwithstanding the existence of a privy. And that which is collected in the privy tanks or cesspools is occasionally so soaked with rain water, and at best so imperfectly dried up by the added ashes, that for the abatement of a nuisance it becomes necessary to give these middens connexion with the town drains. The liquid part here too, therefore, drains away, and the remainder, while fouled for any other purpose, becomes of very little value agriculturally.

Even where the scavenging is organized and well directed, as it appears to be in both Liverpool and Manchester, much of the nuisance of the privy system seems unavoidable. Taking the latter town for an example of even better management than can be ordinarily expected, it is impossible for any one examining the poorer and even the second-class districts of the town to avoid the conclusion that most injurious accumulations of filth are suffered to exist. In spite of district inspection under an energetic and experienced chief, in spite of police assistance, and not-

withstanding that the penny post enables every householder so easily to give notice to the scavenger, privies and ash-pits are continually to be seen full to overflowing, and as filthy as can be. Even in the outskirts and good districts of the town, long rows of houses stand back to back, separated by only a 10 or 11 yards interval ; and this is divided by a mid-way narrow passage, on both sides of which the privies stand, singly, one to every house, or in pairs, each couple separated by an ash-pit common to both. These middens are cleaned out whenever notice is given that they need it, probably once half-yearly on an average, by a staff of night-men with their attendant carts. Occasionally twenty or thirty "middens" are thus cleaned out in succession, the contents being wheeled along the whole length of the row, making the air offensive for several nights together, and creating a nuisance, none the less injurious because, the work being done when the people are asleep, the filthy smell is not perceived.

The contents of these ash-pits are divided by the scavengers into so-called *dry* and *wet* ; and it is a matter of serious importance that it is the latter, or obviously, filthy part alone which is carried to the manure depot ; the "dry" rubbish being carried to any place that may be in the course of levelling in the outskirts of the town. Of course such a division is most imperfectly made under such circumstances ; and it follows that land is thus filled up with most objectionable stuff ; and as building extends, the surface is gradually covered with houses which, on such a foundation, cannot fail to be unwholesome dwelling-places. There is now a "tip" in a ravine at Collyhurst, on the north side of Manchester, where land is thus being raised 15 to 20 feet over many acres by the gradual accumulation of filthy rubbish. A sample of water from a pool at the foot of this tip on the outer side of the Queen's road, which here crosses the ravine, taken a few days after rain, so that it represented the drainage water of this bank, and thus fairly indicated the nature of the stuff it had trickled through, and ano-

ther sample taken at a later date, yielded the following results on analysis :—

COMPOSITION OF DRAINAGE WATER FROM
COLLYHURST "TIP."

Results of analysis expressed in parts per 100,000.

	June 12th 1869.	July 21st 1869.
Total solid matters in solution	1643.5 ...	2310.4
Organic carbon . .	32.278 ...	22.591
Organic nitrogen . .	3.631 ...	5.257
Ammonia . . .	29.525 ...	15.440
Nitrogen as nitrates and nitrites	0 . .	0
Total combined nitrogen .	27.946 ...	17.972
Chlorine . . .	331.50 ...	440.0
Mineral matters in suspension	16.88 ...	54.36
Organic matters in suspension	13.48 ...	26.52

It will be seen from the above numbers that these liquids contained a very large proportion of highly offensive organic matter. They were in fact much richer in putrescible materials than any water-closet sewage we have met with. The whole of the made land, indeed, here smells most offensively, and can never be built upon without great risk to the health of those who shall occupy the houses. And this is no exceptional example connected with the privy system. What to do with the fouled ashes which it accumulates—filthy stuff, too poor for use as manure—is one of the great difficulties of the local authorities almost everywhere in Lancashire. In Liverpool, indeed, wherever a privy exists, the whole contents of the ash-pit are taken to the manure barge, and it is only the dry ashes of water-closet houses that are used to level land; but in other towns the same necessarily imperfect division of the contents of the privy ash-pit obtains which has been described as true of Manchester; and there cannot be a doubt that most mischievous results ensue, as dwelling-houses are built over land thus levelled. (See vol. ii., *Minutes of Evidence*, part 3, Q. 878, 879, and 880; also Q. 2616, 2789).

However perfect, then, in theory the ash-pit privy may be as a means of house scavenging in towns, in practice it has been abominable! and though latterly improved by better organization and more vigorous superintendence, and the gradual adoption of various ingenious contrivances, it can never be other-

wise than highly objectionable. Land must get soaked with drainage water from these cesspools—the air must get fouled with their stinking vapours—the sewers must carry from them to the river that which is most filthy and yet most valuable.

It was a good suggestion by an opponent of the system that its friends should picture to themselves the sites of Manchester and Salford, with all their dwelling houses removed, and only the privies left—nearly 60,000 of them—rows, and streets, and crowds of them—scattered about almost as thickly in places as the heaps of manure upon a field that has just received a dressing from the dung-cart—each heap here, however, no mere deposit of a barrow load once a-year, but a constant collection and continual soakage of filth, which has for years been polluting every corner to which air or water could have access. Is this the site on which to build a healthy town? Would it not be the first desire of every sensible man to sweep this filth away, to drain and aerate, and, if possible, sweeten this land before a single dwelling-place was built; at any rate, to put a final stop to the process which has accumulated so much dirt; to which, indeed, one may fairly attribute much of the responsibility for the high death-rate disclosed by the returns from most of the South Lancashire towns. The returns of the Registrar-General, as well as the evidence given before us, shew that typhoid fever, scarlatina, diarrhoea, and other zymotic diseases commit fearful ravages amongst the populations exposed to such pestiferous influences.

It is mainly, of course, because it affects the pollution of the river that the privy and ash-pit method of removing human excrement from large towns has been described; and it must be clearly understood that the very small portion of advantage which it thus confers is won at the expense of great risk to health.

If we exclude from present consideration the various palliatives and remedies which have been recommended for the abatement of some of the evils connected with this system—and which will be described when we

come to treat of the remedies for river pollution—the water-closet is practically the only alternative plan of house scavenging which is possible under the circumstances of large towns. Where it is systematically adopted, the town streets must, of course, be sewered with channels of smooth bore and constant fall, and these must be connected with every house by properly trapped branch pipes. This connexion is generally twofold; through the scullery sink and through the water-closet pan. No doubt, a certain amount of risk is incurred from the possible escape of foul and even of specifically infected gases through these channels, which may thus carry either general ill-health or definite disease into the midst of the household. But the risk is diminished almost to zero, first, by that rapid flushing of the sewer which an abundant water supply ensures, so that they are kept constantly washed; secondly, by frequent artificial ventilation either through open street grids or into specially constructed ventilating shafts, so that there may be a draught inwards at every point excepting those at which an outward draught is permitted or created; and thirdly, by careful trapping. Notwithstanding, however, all these precautions, there will undoubtedly remain a small but indefinite amount of risk incurred by thus connecting, however indirectly, every house with every other in a locality. And to this drawback must be added, as especially coming under our consideration, the fact that the water-closet system directly and purposely pollutes the rivers by conducting as rapidly as possible all fœcal matter straight to the nearest natural watercourse.

To what, then, does a fair comparison of the rival systems lead? The former retains a good deal of excrementitious matter putrefying close by the dwelling-houses, the latter washes it all away before putrefaction has commenced. The former saves perhaps one-fifth of the fœcal matter of the population, wraps it up in ten or twenty fold its weight of ashes, and, at much greater cost than it is worth, gets it carried to the land; the latter without has carried the whole fœcal matter away, or whereas the former wastes four-

fifths, the latter takes the whole directly to the nearest stream; in the former case, however, it is necessarily already putrid, in the latter case it is usually fresh.

To this comparison of the two, it may perhaps be as well to add at once, although it will be more properly discussed hereafter, that the conveyance of filth to the river is no necessary part of the water-closet system. All that is done by the water-closet, as contrasted with the privy, is to load the filth upon a self-acting vehicle which will take it wherever it is wanted—a vehicle which will carry it more cleanly, more cheaply, more immediately than can be done by any organization of man, and horse, and cart. The manure which must be collected from town privies by an army of scavengers, and distributed from the depot by barge or rail, to be afterwards loaded in carts and taken to the field, and spread abroad by hand, and covered by the plough, might, if water were the carrier, be virtually self-borne to the very place where it is wanted, taken almost direct from the water-closet to the field, and there washed in at once with really no labour at all among the very roots of the plants it is to feed. To this, however, we shall return. Meantime it must be added that apart from the final utilization of the fœcal matter, which is more easily accomplished under the water-closet than the privy system, the cleanly wholesomeness of the former, and its greater comfort and convenience, are gradually leading to its adoption everywhere in all houses above the rank of a mere cottage; and it is impossible to doubt, that as in Liverpool, so in other Lancashire towns, whatever may be the difficulties in its way, it will ultimately become the rule.

At present water-closets are in use to only a very small extent in the districts we have been examining. A population of about 1,330,000 use 120,000 privies and 45,000 water-closets, no fewer than 30,000 of the latter being in Liverpool alone; and after deducting an average household for every one of the latter, there are obtained from 110,000 persons using 113,000 privies, 347,000 tons of manure, realizing less than 5d., and costing to remove it less than 1s. per head per annum.

THE IRISH LAND BILL.

PRINTED copies of Mr Gladstone's Irish Land Bill are now in the hands of the public. It is divided into five parts, and contains altogether 68 clauses. There is also a schedule of 12 clauses relating to arbitrations, and a table for the redemption of rent charges, calculated on the assumption that a yearly charge of £6, 10s., continuing for a term of twenty-two years (but payable half-yearly), is equivalent to the sum of £100 in ready money.

The first clause legalizes Ulster tenant-right, with reference to compensation to the outgoing tenant, wherever in Ulster that right is at present in custom; but the landlord may purchase the right from the tenant and thereby extinguish it. No tenant enjoying Ulster tenant-right is entitled to compensation under the Act.

The second clause entitles holders of land out of Ulster to claim compensation if disturbed in their holdings by the landlord. The clause in effect establishes a legal tenant-right in Munster, Leinster, and Connaught. The latter part of the clause stands as follows:—"Any contract made by a tenant by virtue of which he is deprived of his right to make any claim which he would otherwise be entitled to make under this section, shall, so far as the same relates to such claim, be void. Where the landlord has purchased from the tenant of any holding the right of the tenant under such usage as is mentioned in this section, such holding shall thenceforth cease to be subject to such usage."

The following is the third clause:—"Where the tenant of any holding held by him under a tenancy created after the passing of this Act is not entitled to compensation under sections 1 and 2 of this Act, or either of such sections, and is disturbed in his holding by the act of the landlord, he may, if not excluded by the provisions annexed to this section, apply for compensation under this section, and therefore shall be entitled to such compensation, to be paid by the landlord as the Court may think just, regard being had to the improvements on his holding made by the tenant or his predecessors in title, other than such improvements as are in this section specially provided for, and to the loss sustained by him in quitting his holding, so that the sum awarded does not exceed the scale following—that is to say, in the case of holdings valued under the Acts relating to the valuation of rateable property in Ireland at an annual value of (1) £10 and under, a sum not exceeding seven years' rent; (2) above £10, and not exceeding £50, a sum not exceeding five years' rent; (3) above £50, and not exceeding £100, a sum not exceeding three years' rent; (4) above £100, a sum not exceeding two years' rent. Provided that where any tenant entitled to

compensation comes under either the second, third, or fourth divisions of the said scale, the Court, instead of awarding him compensation under such division, may award him, under the division immediately preceding, compensation not exceeding such sum as he would be entitled to under that division. On the assumption that the annual value of his holding is reduced to the sum, or (where two sums are stated) the highest sum stated in such preceding division, and thus his rent proportionately reduced, a tenant applying under this section may make separate claim for compensation in respect of improvements on his holding or reclamation of land; and upon such claim being substantiated to the satisfaction of the Court, the Court shall, in addition to any compensation awarded to him under the previous provisions of this section, award to him such further compensation as the Court deems adequate in respect of such permanent buildings or reclamation of land." [Here follow certain provisions, having for their object the restriction of the tenant in any abuse of the rights conferred on him.]

The fourth clause provides that "any tenant of a holding who is not entitled to compensation under sections 1 and 2 of this Act, or either of such sections, and is not entitled, or if entitled has not obtained, compensation under section 3 of this Act, may claim compensation, to be paid by the landlord, under this section in respect of all improvements on his holding made by him or his predecessors in title."

Certain improvements (those made twenty years before the passing of this Act, those prohibited by the landlord in writing, those made by leaseholders, &c.) are excepted from this clause.

Another important provision of this clause is, that "any contract between a landlord and a tenant, whereby the tenant is prohibited from making such improvements as may be required for the suitable occupation of his holding, and its cultivation in a due course of husbandry, shall be void, both in law and in equity; but no improvement shall be deemed to be required for the suitable occupation of a tenant's holding, and its cultivation in a due course of husbandry, which appears to the Court to diminish the general value of the estate of the landlord. Any contract made by a tenant by virtue of which he is deprived of his right to make any claim which he would otherwise be entitled to make under this section shall, so far as relates to such claims, be void. Where a tenant has made any improvements, before the passing of this Act, on a holding held by him under a tenancy existing to the time of the passing thereof, the Court, in awarding compensation to such tenant in respect of such improvements shall, in reduction of the claims of the tenant, take into consideration the time during which

such tenant may have enjoyed the advantage of such improvements, also the rent at which such holding has been held, and any benefits which such tenant may have received from his landlord in consideration, expressly or impliedly, of the improvements so made."

Clause 5 enacts that—"For the purpose of compensation under this Act in respect of improvements on a holding which is not proved to be subject either to the Ulster tenant-right custom, or to such usage as aforesaid, all improvements on such holding shall, until the contrary is proved, be deemed to have been made by the tenant or his predecessors in title."

Clause 6 is as follows:—"Where any tenant of a holding is not entitled to compensation under sections 1 and 2 of this Act, or either of such sections, and is not entitled, or if entitled has not obtained, compensation under section 3 of this Act, then, if it is proved to the satisfaction of the Court that any such tenant on coming into his holding paid money, or gave money's worth, with the express or implied consent of the landlord, on account of his so coming into his holding, the Court shall award to such tenant, in respect of the sum so paid, such compensation as it thinks just, having regard to the circumstances of the case, with this qualification, that a tenant of a holding who quits the same voluntarily shall not be entitled to any compensation under this section, when it appears to the Court that such tenant has been given permission by the landlord to obtain such satisfaction from an incoming tenant in respect of the money so paid, or the money's worth so given by him, and on such terms as the Court may think reasonable, and such tenant has refused or neglected to avail himself of such permission. Moreover, where the money or money's worth paid or given by any tenant claiming compensation under this section, or coming into his holding, was paid or given in whole or in part in respect of any improvements on his holding, care shall be taken that such tenant shall not receive compensation in respect of the same improvements under this section, and also under some other sections of this Act."

Clause 7.—Where a holding is proved to be subject to the Ulster tenant-right custom, or such usage as aforesaid, the compensation payable in respect of away-going crops shall be dealt with according to the custom or usage; but the tenant of every other holding, which is not proved to be subject to Ulster tenant-right custom, or such usage as aforesaid, shall, on quitting his holding, be entitled to all his away-going crops, or, at the option of the landlord, to be paid the value of the same.

By clause 8 it is provided that ejectment for non-payment of rent shall not be considered as coming under the terms in the Act, "disturbances by the act of the landlord."

Clause 9 provides that a tenant shall be deemed to have derived his holding from the preceding tenant if he has in any form purchased his "goodwill."

Clause 10 entitles leaseholders to compensation only for authorized improvements shewn to be unexhausted. Where the property is of not less than £100 rateable value, a written contract with the landlord resigning all claim to compensation is to hold good.

Clauses 12 to 17 inclusive define the proceedings which are to be taken by landlord or tenant under the Act.

The landlord (by the 16th clause) may extinguish any claim for compensation by tendering the tenant a thirty-one years' lease, providing the Court is of opinion that the terms of the lease are fair.

According to the following clause, the "Court" is to mean the Civil Bill Court, or the Court of Arbitration, constituted by this Act. This Court is thus constituted:—"Where the parties to the dispute desire to settle it by arbitration, they shall refer the same to the valuator appointed to act as assessor to the chairman of the county in which such holding, or any part thereof, is situate, or to an arbitrator, or arbitrators, with an umpire to be appointed in manner appearing in the schedule annexed hereto, and the tribunal so selected shall be deemed, in respect of such dispute, the Court of Arbitration under this Act." [The powers of this Court (which are practically the same as the Civil Bill Court) are then defined.]

Part 2 of the Act relates to the sale of land to tenants.

Clause 30 enacts that "that the application shall be accompanied by a deposit by the tenant of a sum of not less than one-fourth part of the sum agreed to be paid for the holding, and of sum further sum (if any) to be deposited by the landlord by way of security for costs, as the Board (*i. e.*, the Commissioners of Public Works in Ireland) may require."

By clause 31, "the purchase-money on sale made by the Board shall be paid in the prescribed manner into the prescribed bank, and on such payment being made the Board shall convey the holding to the tenant."

Clause 32 provides that the conveyance by the Board under this part of this Act of a holding to a tenant shall, in the case of leasehold land, confer on the tenant an estate in fee-simple in such holding; and in the case of leasehold land, vest the holding in the tenant for the period, subject to the rents, covenants, and conditions expressed in the lease relating to the land of which the holding forms part. The Court shall determine the rights and priorities of the several persons entitled to or interested in any holding sold in pursuance of this Act, in accordance with such rights and priorities."

Clauses 35 and 36 provide for the costs of sale and distribution of purchase-money.

By clause 37 the Court is to have full power to decide all questions whatsoever which it may be necessary to decide for the purposes of this Act, and shall not be subject to or restrained in the due execution of their powers under this Act by the order of any Court.

The Board may refer any matter to the Court for a

and may require the Court to hear any parties, and to decide any question, and receive or distribute any money which the Board may require to be heard, decided, received or distributed for the purposes of this Act.

For the purposes of the inquiries authorized to be made by them under this Act, power is given to the Board with respect to several matters.

Section 38. The Privy Council in Ireland may from time to time make, and when made, may rescind, or add to rules for carrying the second part of this Act into effect.

Section 3 provides for advances by any powers of the

Section 39. Where any sums are due in respect of any transaction under this Act from a landlord to a tenant who is quitting his holding, but has not been paid by his landlord, the Board may, upon the application of such landlord, advance to the tenant, on behalf of the landlord, the whole or such portion of the sum so due as they may think expedient; and such advance being made, such holding shall, in order being made to that effect by the Civil Bill Court, be deemed to be charged with an annuity of 10s. for every one hundred pounds of such advance, and so in proportion for any less sum, such annuity to be limited in favour of the Board, and to be declared to be payable within a term of twenty years, commencing at the date of the advance.

Section 40. The Board may from time to time, upon security as they may approve, advance such sums as they may think fit to any landlord in Ireland, for the purpose of enabling him to reclaim waste lands; where any landlord has contracted for the sale of any waste land, the Board may advance, upon security given by the vendor or purchaser, such sum as they may think fit, not exceeding a moiety of the money contracted to be paid, and upon any advance being made, such waste land, and any lands included in any such security, shall, upon an order being made to that effect by the Civil Bill Court, be deemed to be charged with an annuity of 2s. for every one hundred pounds of such expenditure, and so in proportion for any less sum, such annuity to be limited in favour of the Board, and to be declared to be repayable within a period of twenty years, commencing from the date of the advance.

Section 41, the Board may advance to any person who has purchased his holding, in pursuance of this Act, any sum not exceeding three-fourths of the value of such holding, and, upon such advance being made, the holding shall upon an order being made by the Civil Bill Court to that effect, be deemed to be charged with an annuity of £6, 10s. for every £100 of such advance, and so in proportion for any less sum, such annuity to be limited in favour of the Board, and to be declared to be repayable within the term of twenty-two years, commencing from the date of the advance.

Section 44 provides that where the landlord of an

estate is willing to contract for the sale of his estate in its entirety, but not in part, and the tenants of the holdings, comprising four-fifths in value of such estate, are willing to purchase their holdings under this Act, and other purchasers can be found to buy the residue of such estate, and to pay one-half of the purchase-money payable in respect of such residue, the Board may advance to such other purchasers one-half of their purchase-money upon the security of the residue of the estate.

In part four the 54th clause provides for the imposition of a duty of 2s. 6d. on every notice to quit served on a tenant, and the subsequent clauses lay down further regulations in respect to such notices, and in regard to the administration on the death of the tenant, &c. This clause also enacts that additional salaries shall be paid to the judges of the Civil Bill Court, in consideration of their additional labours.

There is a provision to enable the tenant to deduct from his rent one-half of the amount paid by him as grand jury cess.

Clause 63 provides that where the value of premises does not exceed £4, the immediate lessor is to pay the grand jury cess.

Clause 64. Where any tenancy-at-will is created by a landlord after the passing of this Act, the tenant under such tenancy shall, on quitting his holding, be entitled to notice to quit and compensation in the same manner in all respects, as if he had been a tenant from year to year.

The important question of arbitration is disposed of in the schedule to the Bill, and is as follows :—

1st, If both parties concur, a single arbitrator may be appointed. If both parties do not concur in the appointment of a single arbitrator, each party, on the request of the other party, shall appoint an arbitrator. An arbitrator shall, in all cases be appointed in writing, and the delivery of an appointment to an arbitrator shall be deemed a submission to arbitration on the part of the party by whom the same is made; and after any such appointment has been made, neither party shall have power to revoke the same without the consent of the other. If, for the space of seven days after service by one party on the other of a request made in writing to appoint an arbitrator, such last-mentioned party fails to appoint an arbitrator, then, upon such failure, the party making the request, and having himself appointed an arbitrator, may appoint such arbitrator to act on behalf of both parties, and such arbitrator may proceed to hear and determine the matter in difference, and in such case the award of such single arbitrator shall be final.

If, where more than one arbitrator has been appointed, either of the arbitrators refuses or for seven days neglects to act, the other arbitrator may proceed *ex parte*, and the decision of such arbitrator shall be as effectual as if he had been the single arbitrator appointed by both parties.

If, where more than one arbitrator has been appointed, and where neither of them refuses or neglects

to act as aforesaid, such arbitrators fail to make their award within twenty-one days after the day on which the last of such arbitrators was appointed, or within such extended time (if any) as may have been appointed for that purpose by both such arbitrators under their hands, the matters referred to them shall be determined by the umpire to be appointed as hereinafter mentioned. Where more than one arbitrator has been appointed, the arbitrators shall, before they enter upon the matters referred to, then appoint, by writing under

their hands, an umpire to decide on any matters on which they may differ.

If in any of the cases aforesaid the said arbitrators refuse, or for seven days after request of either party to such arbitration neglect, to appoint an umpire, the Civil Bill Court, as defined by this Act, shall, on the application of either party to such arbitration, appoint an umpire. The decision of every umpire on the matters referred to him shall be final.

Farm Architecture.

WATER SUPPLY TO COTTAGES AND FARM HOUSES.

IT is difficult to name any department of "Sanitary Construction" which is of greater importance than this, for it seems to us obvious enough, that however well built, conveniently arranged, and supplied with adjuncts for ensuring health and comfort, a house may be, it cannot long remain a "healthy house," or a decent one, without a good supply of water; while, on the other hand, a very well arranged house without it, may become a very pest-house of disease. When people become accustomed to dirt, when its presence is either unperceived or unfelt, there is no limit to the downward tendency.

With reference to the supply of water to the dwelling places of the labouring classes, we deem it of essential importance that it should be taken to the interior of the houses, or at least within the precincts of the house, as the yard or garden. It is not enough to say that a pump or stand-pipe has been erected in the neighbourhood, to which access may be easily had, even if the supply at this place is always "on," the conditions of a perfect water supply is not fulfilled. We must recollect that a poor man's time is money, and that after a hard day's work, the work of going out to carry home a supply of water involves the outlay of severe labour, as well as of a pecuniary loss. Throughout the country the "waste of labour" thus incurred has been calculated to be "enormous." Again, we must recollect that it is a duty to throw every facility in the way of the poorer classes to cultivate, and carry into daily practice, habits of personal and household cleanliness, and it is absurd in us to hope for this being done when we throw obstacles in the way. Let it be always borne in mind by those who purpose establishing improved dwellings for the

poor, "that the interposition of the labour of going out and bringing home water, acts as an obstacle to the formation of better habits, and I deem an important principle to be borne in mind, that in the actual condition of the lower classes, conveniences of this description must precede and form the habits. It is in vain to expect of the great majority of them that the disposition, still less the habits, will precede or create the conveniences." This, the opinion of one in every way entitled to confidence, is full of suggestive considerations to us all.

Still further, it is to be noted that where water is not laid on to the houses of the poor, but the supply has been obtained by carrying it from a distance, the water obtained is kept in vessels generally placed near, if not within the living apartments. Now science informs us that such is the absorptive power of water, or its facility for taking up deleterious gases, that in a short time water thus stored up becomes deteriorated in quality, and by consequence most unfitted to be used for food. But further, it must not be forgotten that, where, as in too many cases, more especially in rural districts, it unfortunately is the fact, water has to be carried home from a distance, the labour involved, and the other circumstances connected with the practice, induce amongst the labouring classes a moral influence of a debasing kind. "If water," says a working man, "were laid on in the house, all of us labouring men would keep ourselves much cleaner, and our homes much cleaner. The water which we keep in the tubs soon becomes spoilt and unfit to be used as drink." To carry water after the usual hard labours of the day, is not to be expected to be done cheerfully, "it is only done for the most

urgent purposes, cleanliness is entirely neglected, and their persons remain in a dirty state." There is much truth conveyed in the proverb, "Cleanliness is next to godliness." "Between physical and moral delicacy," says Jeremy Bentham, "a connexion has been observed, which though founded by the imagination, is far from being imaginary." Howard and others have remarked it. It is an antidote against sloth, and keeps alive the idea of decent restraint, and the habit of circumspection. Moral purity and physical are spoken of in the same language, scarce can

you inculcate or command the one, but some share of approbation reflects itself upon the other."

When it is recollected that the water of the poor is nearly always exposed to the noxious gases and agencies which arise from privies, and the slow decomposition of the refuse in the yard, and also from those in their close, offensive, and impure dust-bins, it will be at once understood that such water produces much and severe diarrhoea and other diseases.

HOME TIMBER FOR BUILDING PURPOSES.

THE management of home timber for building purposes involves several points of importance, and to which, in the following paper, and in that of others to follow, we purpose drawing the special attention of our readers. The first practical point is the period of the year at which the timber should be cut down or felled. The points of importance bearing upon this we now proceed to notice. Before giving these, however, it will be well here to note that, for building purposes, it is necessary that the trees, at whatever period of the year they may be felled, should not be allowed to stand so long as to exceed their average period of growth. This is important, when we consider that timber allowed to be too old before it is cut, is likely to be what is technically known as "star-shakes." Star-shakes in *old* timber are cracks in the wood, which radiate from the centre to the circumference of the tree, having their greatest width or extent of opening towards the centre of the tree, or that part where the timber is most valuable; whereas in young trees the *new* shakes, while radiating as above, have their widest opening at or towards the circumference of the tree, or at that point where the least valuable part of the wood is met with. This point bears, then, upon the value of the timber. But it also appears that the

value is influenced by the season of the year at which the timber is felled. The best season would be that immediately preceding the period when the "sap" movements begin in early spring time. But where the number of trees to be felled are numerous, it is obvious that it would be too costly a process to organize a band of workmen sufficient in number to get all the trees felled at this period. Practically, therefore, the felling season should extend itself from the period when the sap movements or active vegetation ceases, in the autumn, to the period before it begins in the spring—or, in other words, between the months of October and April. The influence of the season upon the value of timber is shewn in a very interesting statement by Mr Justin, a great authority upon this point:—

A trial, he says, was made in Germany with four pieces of oak, cut down in December, January, February, and March. A tin ring was fixed at one end of each of the four pieces; these rings were filled each with 2 quarts of water, and it proved that the piece of wood cut in December did not permit any water to pass through its pores. The January wood, after forty-eight hours, passed a few drops; during the same time the entire quantity had run through the February wood; and the water had passed through the March wood in two hours and a-half. This accounts for the fact that barrels, of which the wood was felled in February or March, will lose within a year as much as 8 quarts of water, whilst others lose

hardly any at all. One should suppose that wood would absorb salt water more easily than fresh water, because of the pressure of the former being so much higher; still, this is not the case; and Mr Duhamel has proved this by an experiment. He took two pieces of oak from the same plank, each weighing 5 lb. During eleven months the one was exposed to sea water, and increased only by 2.141 lb. in weight, whilst the other put into fresh water increased by 4.141 lb. in weight.

As the sap movements in timber exercise a most important influence upon its value, it will be interesting here to glance briefly at a few points connected with them. The sap of trees, which is composed of oxygen, nitrogen, hydrogen, carbon, and sulphur, and which forms a considerable proportion of the bulk of the green or fresh wood, is, as may be supposed, a varying quality, and that according to the season. At first sight, from the fact that the sap movements are most active in the spring months, it might be supposed that the amount or quantity of sap in trees would be greatest in spring. Accurate experiments shew that

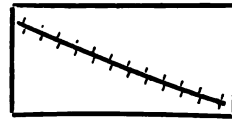
this is not so, and that the greatest quantity is met with in the months of December and January. It gradually diminishes in the months of October, November, February, and March, next in April, May, August, and September, the minimum being in the months of July and August. Of course, these general statements must be modified by circumstances, such as dry and wet seasons, but the rule, as a whole, stands as we have put it. After being cut down, the sap, as a rule, evaporates gradually; it is only in some cases that the sap is got rid of, its flowing or exuding from it, and this flowing out is greatly dependent upon the state in which the timber is after being felled; for if the bark is stripped, the flowing out of the sap from the wood is much quicker than in cases where the bark is allowed to remain on. With bark stripped off, the weight of the sap gradually diminishes, but with the bark on, this fluctuates, moisture evidently being absorbed from the atmosphere by it.

Farm Implements and Machines.

THE NORWEGIAN HARROW AND JERSEY CULTIVATOR.

OF the class of implements the office of which is to pulverize the soil, we may notice the Norwegian harrow as a clod-crusher and a bringer up of the surface weeds: its reputation with some farmers is very high. It is composed of an iron frame-work carried on three wheels, two being behind and one before, which acts as the guiding wheel. This central frame carries supports at each side, from which are suspended three axles running across the framing. On these axles a series of star-toothed wheels are placed, each wheel having six teeth or tines, so placed that the tines of one row of wheels revolve between the teeth of the wheels in advance. The central frame carries at its upper side, and near the end farthest from the horses, a cross shaft, which can be moved on its centres by a lever handle within reach of the driver. The shaft extends beyond the frame, and carries at each end a lever, to the lower end of which a wheel is fixed. By turning the cross shaft these levers are raised up, and with them the wheels, and the framing, with the revolving tines, is consequently brought into contact with the soil. The handle working the cross shaft is connected with a quadrant, by means of which the tines can be kept at any desired height from or in the soil. The tines are made of steel, split at the ends, and are arranged in rows of three on each axle, and are so placed that the three wheels revolve in the same direction. The revolving action of the implements is produced by the wheels revolving on their bearings. The tines being at an obliquity to the line of traction, in place of being at right angles as it is present used. This principle is carried out in the Jersey cultivator, in which the tines or cultivating teeth are set on a shaft,

which shaft is placed diagonally in the frame thus—



The frame is supported upon wheels, and an arrangement is introduced by which these are raised or lowered relatively to the frame, and thus, of consequence, reversed or lowered, and the tines made to take greater or less hold of the soil. This diagonal action of the tines is of great importance in reducing soil to a fine tilth, as it is brought up gradually to the action of the tines.

In using the Clod crusher and the Norwegian harrow, it is too often—and dissatisfaction is consequently the result—that there is *one* condition *only* of the soil in which they will display their *best* effects. What the exact condition is will depend greatly upon the nature of the soil and locality, and which experience and careful observation will alone enable us to discover. But the condition in which the soil should *not* be is a much more easy thing to know; it should not be wet and tenacious, and of a bird-lime character. When soil is in a condition, such as we have heard some soils graphically described, as "being fit to be spun into ropes," depend upon it that is not the time to send your implements upon it. We do not wonder at bad farming existing when soil is thus worked—or rather *attempted* to be worked—for worked in the best sense it is not in a condition totally the reverse of what it should be. For pulverizing implements, the best condition for the soil to be in is that mellow state in which lumps of

it, when struck, open and crumble up. The two extremes are wet and plastic, and dried-up brickly states; and if you work in any of these two conditions, you will not get the good out of your implements you may expect; the first condition is the worst, doubtless. The moment you have your land in the mellow state, lose no time in getting your work done. The capability to compress a large amount of work into a small space of time, which is worth so much when the soil is in "good heart"—a most expressive phrase that, by the way—is just, in fact, one of the grand characteristics of steam cultivation, to the consideration of which some future remarks will be devoted. Meanwhile, before concluding these, let us point out the curiously suggestive point that these implements which we have, in this and recent articles, just been considering—the Roller, the Clod-crusher, the Norwegian harrow, and all such cognate implements—however admirable in their operation, are very possibly mere necessities brought into existence through a bad system of cultivation. Thus, it is not a conjecture, but a well established fact, that some implements, and modes of employing them, pro-

duce a greater number and a harder and a more obdurate condition of clods than others; and that, on the other hand, an improved system of cultivation carried out by improved implements, does not produce clods at all. It may seem strange to some to doubt that clods and hardened nodules of soil are natural concomitants of the soil. But natural as they may appear to be, they are often, in truth, the result of a bad style of culture. By working the soil at a proper time, and by proper implements, we get the soil into a finely pulverized condition, without requiring the aid—or, if requiring it, only in a very moderate degree—of such implements as clod-crushers, rollers, and the like. The atmospheric influences are the best pulverizers of our soil, and that mode of culture is the best which aids the action of the atmosphere. We have all along advocated the opinion that the wide array of our implements and machines arose from the necessities of a bad system of culture; and that, by introducing a more perfect one—as, for instance, the "deep culture"—we would reduce our implements to a minimum, very much below what at present is the rule.

THE CLOD CRUSHER.

WE concluded a recent article on the Roller by drawing attention to the differential action produced by dividing the roller into two or three lengths, and to which different velocities were given in moving over the land, or in turning at the ends. This differential action would be greatly increased by still further dividing the length of the roller into separate rings or discs, and the result would be a combination of crushing and pulverizing. The most perfect clod pulverizer would be a roller divided into a number of discs, and in which some arrangement was adopted by which the clods were lifted up and passed between the faces of the discs, which would be of a certain breadth or thickness, and to which discs differential move-

ments would be given. This rubbing action is to a large extent obtained in the clod-crusher, which may be imagined to have been originally an ordinary roller cut up into a great number of narrow discs, and slung, so to say, on a central axis.

The clod-crusher is, perhaps—in the present condition of agriculture, when clods *will* appear to vex the farmer—one of the most useful implements which modern times have produced. Indeed, it is no exaggeration to say that its use has added largely to the productive capabilities of our heavy soils. The clod-crusher is not, however, simply a roller, with a flat periphery cut up into a series of small or narrow rollers, with flat peripheries also; the edges are serrated or divided into

a series of angular notches. The action of these wedges upon the soil—the rate of revolution of which varies according to the condition of the soil over which they pass—is also rendered still more efficient in cutting and grinding the clods by giving each division an eccentric movement upon the central axis. This is done in an ingenious, effective, yet most simple way, by merely making the eyes of each serrated wheel or roller considerably larger than the axis upon which it is placed. When a number of these wheels are strung, so to speak, upon the central axis, each of which meets a different surface of soil to act upon from that of its neighbour, one can easily conceive how not only a series of vertical risings and fallings will be given to the wheels as they come

projecting snugs being cast on the sides of the discs, which act as breakers and movers down of the clods which get between the discs. Thus, let *a b c d*, in fig. 1, represent two discs on the central shaft, the edges of which are serrated, and *e f* the projecting snugs on the inner sides of the discs. The clod-crusher

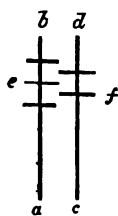


Fig. 1.



Fig. 2.

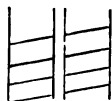


Fig. 3.

in contact with different sizes of clods, but that a side or lateral motion also will be given to them as they sway to and fro upon the axle, in consequence of the large diametered eye holes.

The forms of the discs and the method of arrangement of them on the central axle, are now pretty numerous, various modifications having been introduced according to the ideas of different makers. Originally, the clod-crusher as invented by Mr Crosskill, of Beverley, and as described above, was formed by a series of discs, the edge or outer peripheries of which were serrated or saw-edged. In the most recent modification, this serrated edge is still retained, but the discs are placed at wider intervals, so as to admit of



Fig. 4.

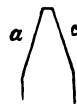


Fig. 5.

made by Messrs Ashby & Jeffrey, of Stamford, is very much on the same principle, as is also that made by the Beverley Iron Company, but with spaces between the rings filled in, if we remember aright, with plain edged discs. In the clod-crusher made by Messrs Coleman & Morton, of Chelmsford, the edges of the discs are made zig-zag fashion, as in fig. 2, the outer peripheries being made as represented in fig. 3. In the form patented by Mr Spencer, and made by the Reading Iron Company, the peripheries of the discs are provided with projecting rubbing parts, and arranged relatively to one another, as will be seen in fig. 4. Some clod crushers are mere modifications of the old-fashioned drill presser. The form of the periphery of the disc of which was similar to that represented in fig. 5, the modification being in making the parts *a a* concave, in place of flat or right-lined, a number of these concave edged, being strung together, either close or with intervals, on a central shaft. This is the form of the implement made by Mr Roby, of Bury St Edmunds, who uses a scraper to relieve the concave edges of adhering soil; of Messrs Hunt & Pickering, of Leicester; of Messrs Amies & Barford, of Peterboro'; of Mr Lewis, of Shrewsbury; and of Mr E. Cambridge, of Bristol.

SMOOTHING HARROWS.

THE Editors of the *Albany Cultivator* has been experimenting with a harrow specially designed for smoothing the soil and eradicating weeds; and it appears to do its work thoroughly, we think all do our readers a service in bringing it under notice.

The harrow is made of pieces of plank, hinged



—Side view of Section, shewing the slanting Teeth

her so as to fit uneven surfaces, and through these is a large number of spikes are driven, constituting the teeth. The teeth slant *backwards* at an angle of about forty degrees, which cleans them of all rubbish,

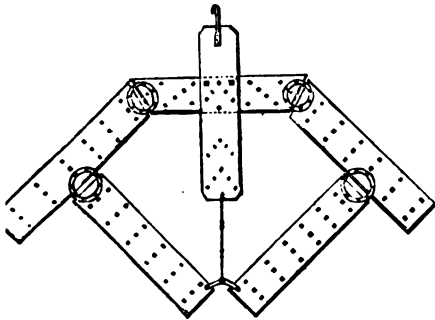


Fig. 2. —Plan of Harrow.

enables them to pass freely over stones or other obstructions, and prevents their tearing out the plants of corn, wheat and other crops, which they are used to cultivate. At the same time they mellow and smooth the surface, and destroy all young weeds which are making their appearance.

This harrow has been successfully used for harrowing

wheat in spring, brushing in grass seed, mellowing the surface for receiving turnip and other small seed, smoothing ground intended for meadow as a substitute for the roller, and for destroying or preventing weeds among corn and other cultivated crops. It promised the most important value for the last mentioned purpose, being likely to supersede entirely the labour of hand-hoeing. After the corn is planted, and as soon as the crust begins to form on the surface of the soil, it may be passed over the whole, mellowing the top, and if repeated every three or four days, entirely preventing the growth of the weeds. The corn, being the larger and stronger plant, is not injured by the teeth, which will readily kill all weeds if not more than an inch high. In the experiments which have been performed, the corn thus repeatedly harrowed made a more rapid growth than on other portions of the field where the harrowing was purposely omitted. Another advantage was the perfect pulverization of the surface, rendering the subsequent cultivating more easy and perfect.

A decided advantage has resulted in brushing in clover seed. In one case it was sown a month later than usual, and was followed by a hot, dry season, yet the growth was dense and luxuriant, and was estimated more than double in denseness of that on adjacent ground, where merely sown on fresh soil. It has also answered a good purpose for breaking up the lumps of manure used in top-dressing grass; and it has been found that where the top-dressing is worked over and spread evenly with this harrow, the bad flavour imparted to grass by leaving the manure in lumps is prevented. These are some of the results of the experiments which have been made with it, to which we may add that of smoothing and pulverizing the surface for receiving small seed in drills; while for levelling and pulverizing ground before planting nursery stock, it is superior to either the common harrow or roller.

It may be manufactured at a moderate price, and no skill is required to use it, as it is simply drawn over the surface.—*Seedsman*.

Our Pasture Grasses.

POA TRIVIALIS* (Linnæus) ROUGH-STALKED MEADOW GRASS.

SYNONYMS.—*Gramen pratense minus*, or small meadow grass of Gerarde. *Gramen pratense paniculatum* medium of Bauchin, 1671. *Poa dubia* of Leers, 1775. And *Poa scabra* of Ehrhart, 1790. See also under VARIETIES.

ROOT perennial and fibrous, never spreading under ground; but the slender leafy shoots creep thickly over its surface, sending down rootlets freely at their joints. Stems smooth-jointed, usually from 15 inches to 2 feet in height, sub-erect, five- or six-jointed, round, and, as well as the leaf-sheaths, roughish to the touch when the fingers are passed over them upwards; the upper sheath being much longer than its leaf, and furnished at their junction with a long pointed ligule. Leaves of an agreeable lightish green colour, flat, narrowish, thin, or somewhat flaccid, acute pointed, and slightly rough on both surfaces. Inflorescence panicled, erect, or nearly so, and well spread when in flower, but afterwards becoming gracefully bent or drooping, and considerably contracted; the lower branches from three to five together, and, as well as the others, very perceptibly rough. Spikelets ovate, compressed, and containing two to five awnless florets. Calyx of two nearly equal glumes, or outer chaff-scales, the upper three-ribbed, and the lower with only a dorsal rib, which, as well as that of the upper, is distinctly toothed. Florets of seeds, delicately webbed at the base, and the lowest floret smooth, except at the base, where it is rough.

It is supposed to have been arbitrarily or fancifully applied by the first Swedish naturalist, from its comparatively light and insubstantial growth.

NATURAL DISTRIBUTION.

Very common throughout Britain in meadows, moist and shady places, by road-sides, &c., at altitudes not exceeding 2500 feet. It is also found plentifully in all other European countries, as well as in Northern Asia, Iceland, and North America; but wherever met with in the Australasian colonies, or other southern parts of the globe, its presence is supposed to be traceable to agricultural introduction.

QUALITIES AND USES.

The Rev. Mr Swayne, Mr Curtis, and Dr Anderson had seeds of the *P. trivialis* in their collections noticed under *P. pratensis* (p. 244); but they appear to have been preceded in its cultivation by Mr Boys, a farmer of high reputation at Betshanger, in Kent, who began to cultivate it about 1780; and in 1785, he had from 20 to 30 bushels of its seed for sale, which he offered at 3s. per lb., but was obliged to discontinue its seed cultivation for want of demand. According to the Woburn experiments, the produce from a brown loam with manure was, at the time of flowering, about 7487 lb. per acre, which lost fully 40 lb. in drying; while, at the period of seed-ripening, the weight had increased to 8000 lb., and the loss in drying was only 100 lb.; the latter-math weighed 4764 lb. The above results shew the acreable produce of this to be under that of the *P. pratensis*, both at the times of flowering and seed-ripening; while the latter-math is considerably greater. This may have arisen from the soil on which it was grown having been

too dry, or from some other unexplained cause; for if its best varieties are selected for cultivation, they will be found more productive at all stages than those of the other. The roots of this species being strictly fibrous, and spreading as it does solely, and somewhat rapidly, by means of its above-ground creeping stoloniferous shoots; it is less soil-exhausting than most others. And although unsuitable for alternate husbandry where only one crop of hay is taken, it may be advantageously introduced into all other grass seed mixtures, whether for hay, pastures, or ornamental lawns, except when to be sown on very dry, sandy, gravelly, or thinnish soils, where it would be almost certain to die out in periods of extreme, or even ordinary drought. It will, however, retain its place in moderately dry soils of medium fertility and texture; but grows most freely on such as are shaded and somewhat moist; hence it is particularly suitable for irrigated grass lands, and more especially those where town sewage is used. When thus favourably situated, its thickly spreading shoots fill up all interstices among the more upright growing grasses, and it forms a particularly rich verdant ground covering in spring, as well as throughout the autumn, and in open or fresh winter weather. A prejudice formerly existed against its employment in fine scythe-kept lawns, in consequence of its spreading ground-surface shoots being easily raised by the rake or broom, in clearing off the cut grass, but this objection is untenable wherever self-collecting mowing machines are used. And it is especially suited for city and suburban gardens and lawns, where, in open winter weather, its young growth of fresh vivid green leaves contrasts agreeably with the dingy smoke-defiled autumn-grown foliage of the fescues and other evergreen or sub-evergreen grasses. In collecting grass culms for making straw plait, those of the rough-stalked meadow grass should be carefully discarded, as their characteristic roughness of surface renders them retentive of dust and the foulness of smoky atmospheres.

SEED AND SOWING.

Seeds distinctly, but less copiously webbed

at the base than those of the *P. pratensis*, although sufficiently so to impart that appearance of mouldiness, and produce those sickening effects upon unpractised operatives, mentioned at page 187, as pertaining to those of that species. In length they are between 7 and 8 to the inch; weigh, on an average, 15 lb. per bushel; and about 217,000 are contained in an ounce. The greatest number braird when not covered with more than a-quarter of an inch of soil, about half as many when the covering is from a-half to three-quarters of an inch, and none come up from under a depth of an inch and a-half; hence the utmost care is requisite in the previous preparation of the soil, and in not covering the seeds too deeply at sowing. About 7 lb. to the acre has been deemed sufficient for sowing without any other mixture, but from 10 lb. to 12 lb. will be a safer allowance. And in mixtures, the quantities vary from 2 lb. to 4 lb., according to the soils and the purposes for which the produce is intended.

CHEMICAL ANALYSIS.

The Woburn experiments shewed that, at the period of flowering, the nutritive matter contained in an acre was almost 234 lb., which, instead of falling off, as in the case of *P. pratensis* (p.) 187, had increased by the time of seed ripening to fully 336 lb., and that of the latter-math was 223 lb., or nearly double the estimated yield of the other. The more minutely detailed analysis by Professor Way, of specimens collected in the vicinity of Cirencester, when in flower, on the 18th of June 1849, shewed the grass to contain, when in a fresh state, water, 73.60; albuminous, or flesh producing principle, 2.58; fatty matter, 0.97; respiratory principles—starch, gum, sugar—10.54; woody fibre, 10.11; and mineral matter, or ash, 2.20. In a dry state—albuminous, or flesh producing principle, 9.80; fatty matter, 3.67; respiratory principles—starch, gum, sugar—40.17; woody fibre, 38.03; and mineral matter, or ash, 8.33.

VARIETIES.

Unlike those of *P. pratensis*, the varieties of *P. trivialis* seldom present any difference



Poa trivialis—Natural size.

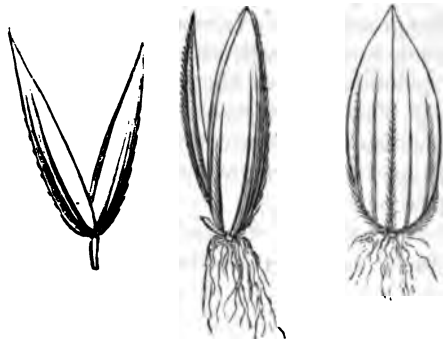
the agreeable light green colour of their foliage ; nor do they differ much in other respects, save in the comparative breadth of their leaves, and occasionally in the deeper

breadth of leaves ; from which the following are the only variations of importance.

1. *Poa trivialis alba*, or white rough-stalked meadow grass ; has white anthers, whitish-green panicles and stalks ; but these last are, from their roughness of surface, unlike those of *P. pratensis alba*, unsuitable for



Reduced size, shewing habit of growth.



Calyx magnified. Floret magnified. Outer Palea magnified.

the manufacture of straw plait. The leaves are also a shade lighter in colour than usual, and the dried panicles are very suitable for making artificially-coloured grass bouquets, found occasionally wherever the species is common.



Poa trivialis—Seeds magnified three diameters.

rown colouring of their stalks and panicles. The preceding description is applicable to the most common, or what may be termed the intermediate form of the species—as to

2. *P. t. angustifolia*, or narrow-leaved, rough-stalked meadow grass, has very narrow leaves, and is of less vigorous growth than the next. It is most common on inferior soils, especially those of a peaty nature, and in shady places.

3. *P. t. latifolia*, or broad-leaved, rough-

stalked meadow grass, is distinguished from the other by its broader foliage, as well as somewhat stronger habit of growth; and it is among its sub-varieties that those most deserving of cultivation are likely to be found. Most common on strongish, rich, moist soils, in open or but slightly shaded places.

4. *P. t. parviflora*, of Parnell.—A small slender-growing, very narrow-leaved variety, with only one or two florets in each spikelet, and smoothish stalks; but having the acute oblong ligules, rough leaf, sheaths, and creeping leafy shoots, which are characteristic of the species. Somewhat common in shady moist woods.

5. *P. t. setacea*, of Smith's "English Flora," and the *P. setacea* of Hudson's "Flora An-

glica."—Is a short, slender, somewhat bristly-like leaved depauperated-looking variety, occasionally found in moist, gravelly, or peaty place; and of no agricultural importance.

6. *P. t. variegata*.—A beautifully variegated, white, reddish, and green-leaved variety; now held in considerable repute by cultivators of ornamental foliaged plants, whether in the greenhouse or the open ground. It has been grown and lost in curious plant collections at different times, and was very successfully reintroduced by Messrs E. G. Henderson & Son, of the Wellington Road Nurseries, to whom a certificate of merit was awarded for it three years since, under the name of *Cynosurus cristatus variegatus*, by the Royal Horticultural Society of London.

The Farm.

MANGOLD WURTZEL CULTURE IN THE NORTH.

TO agricultural tourists travelling throughout the north in the summer or autumn, nothing is more striking than the almost total absence of mangold wurtzel from the fields beyond the Tweed. Seeing that the other field crops are at least not inferior to those in the south, it is difficult for them to believe in the truth or reality of the reasons usually assigned for this all but total absence of mangold. The principal reason given for not growing it is, that the climate of southern England is more suitable for mangold wurtzel, and less so for the growth of turnips. Then there is the allegation that the Scotch summers are too short and cold to admit of the crop coming to maturity. Next comes the supposition that its culture is attended with much more care, trouble, and expense, than that of turnips. And lastly, that the crop will not stand frost, but must be cleared off the ground and stored at an inconveniently early period of the autumn; associated with which is the idea that this storage for winter and spring use, entails much more trouble and cost than that of turnips.

Admitting that the south of England possesses a more suitable climate than Scotland for the growth of mangold, and that the latter is more favourable for turnips, this is no sufficient reason why mangold culture should be almost entirely neglected in the north, more especially as it can be grown there reasonably well, and that some of its varieties are now so far improved in size and earliness as to be capable of yielding heavier crops in what may be termed the wheat-producing districts of Scotland, than those which existed half-a-century ago did in the south. Of late years the turnip crop has become notoriously uncertain in the best agricultural districts of the north, from the extreme summer heat, drought,

and other causes favourable, or at least not inimical, to the growth of mangolds. And only last season, many fields might be seen, both of Swedes and common turnips, which, although they looked well in July and beginning of August, had utterly perished by the middle of September; while occasionally drills or small patches of mangolds, growing among or alongside of them, remained fresh and healthy. A proof alike of the propriety of having "two strings to the bow," and the impropriety of placing exclusive dependence upon any one kind of crop, and that a precarious one, the loss of which would have been greatly mitigated by the partial substitution of another that was less liable to suffer from unfavourable weather or insect ravages.

The prevailing opinion among Scotch farmers, that their summers are too short and cold to allow of the mangold arriving at maturity, or even attaining to fair size, has its origin in their general non-acquaintance with its cultivation and habits of growth. Accustomed to see their turnips invariably running to flower when sown so early that they braird before the last spring frosts are past, they conclude that mangolds will shoot, in like manner, if the young plants are checked in their growth by frost. And turnips in which running to seed or shooting has commenced, being no longer capable of increasing in size, or useful for feeding purposes, shooting mangolds are supposed to be equally worthless; which, however, is by no means the case, for we have frequently sown mangolds from the middle of March, at intervals of about a fortnight, till the beginning of June; and although the young plants of the early sowings were repeatedly subjected to pretty smart frosts, the per-centages of shot plants among them was very little greater than among the

last sown ones ; while both the shot and un-shot roots of the former attained to good sizes—thirty tons per acre ; and the plants of the later sowings yielded little except leaves. Neither did the shot roots in any case become hard and woody, like those of turnips, but retained their juicy tenderness scarcely impaired. Gardeners occasionally make their earliest sowings of beet in the end of February, or along with their carrots and parsnips, as early in March as the ground can be got sufficiently dry. Now, garden beets being only finer and more delicate varieties, derived from the same origin as the field beets or mangold, it follows that the latter may be sown at least equally early. Let northern cultivators, therefore, sow earlier than they have ever dreamt of doing, and they will ensure the return of bulky crops by thus gaining time at the first and best end of the growing season.

As to the supposition that the culture of mangold is necessarily attended with much more care, trouble, and expense than that of turnips, it can only be characterized as a fallacy, for which there is no tenable foundation. If sown sufficiently early, an extra horse-hoeing may be requisite to keep the weeds under. And although a difference in the mode of thinning is practised, the expense attending it is not greater. On this subject, that undoubtedly eminently qualified author, Mr John C. Morton, states, in his "Cyclopædia of Agriculture," that, on the whole, the cost of labour, seed, and manure, is about equal to that incurred in the cultivation of the turnip ; and he assumes that of the sowing to be under 2s. an acre ; seed, 4s. 0 5s. ; and hand-singling, or thinning, of the young plants, about 1s. 6d. per acre. Under his head may be noticed an objection which we have repeatedly heard advanced by northern potato growers, viz., that they could not engage with any other drilled green crop till after potato planting was finished ; by which the land would be late enough, and all their energies had to be devoted to Swedish turnip sowing. "Where, however, there is a will there is always a way," and even the most conservative potato growers—who have in them

but an uncertain crop to depend on—might find it advantageous to devote a portion both of the land, and early spring time, to mangold sowing.

In regard to the concluding objections relating to the early removal and winter storage of mangold, the work is complained of as interfering with the wheat sowing ; but this is equally applicable to early turnips ; and, like them, the mangold is a good preparatory crop for wheat. Next, "the uncertainty of our climate" is a standard excuse for many sins of omission ; and that early frosts are apt to destroy a whole crop is as applicable to England as to Scotland ; but in the former, experience has taught growers to make all safe in good time ; and a little of this, combined with their proverbial northern caution, would soon be found equally efficacious by those of the latter. Winter storage is another bugbear that is easily disposed of. Quoting again from the above-named authority—his directions are :—"Set up a row of hurdles, 9 feet apart, and backing the loaded carts between them, tilt the roots up, pile them up to the height of the hurdles, and in a roof-like form above that height. Another row may be made within a yard of this one. And any requisite extent of ground may be covered with rows in this way. A very little straw is to be placed between the hurdles and the roots ; and a good thickness, say 12 inches, of straw is to be placed, and roughly thatched over them, the bushy eaves of this thatch, interlocking over the intervals between the rows, furnish ample protection against frost." Nor can cheaper and equally effectual means be employed for the safe storing of turnips.

For the benefit of inexperienced cultivators who may be desirous of trying to grow mangold wurtzel, the following hints are added. Thoroughly reduce the soil by repeated ploughing, grubbing, &c. Form the drills, and apply manure, all as for Swedish turnips. Being in its unimproved state, a sea-shore inhabiting plant, the addition of 4 or 5 cwt. of salt will be found advantageous in inland situations, if thoroughly mixed or incorporated with the soil before drilling up ; and double or triple the quantity may be given

when applied on the autumn ploughed stubble. As beginners may not feel disposed to incur the expense of a proper sowing machine, the best substitute is to pass the turnip one along the drills, so as to leave a furrow from $1\frac{1}{2}$ to 2 inches in depth, in which to deposit the seed by hand. Seven lb. of it is an ordinary allowance for an acre; but until the hands are properly accustomed to the work, it will be safer to allow 9 or 10 lb. Some prefer dropping the seeds in clumps at from 12 to 14 inches apart; and afterwards taking out all except the best plant in thinning; but many prefer sowing the seeds continuously along the drill. In either case they may be covered in with an ordinary garden rake, or light drill roller. If sown continuously, it is a good plan to leave the young plants at double thickness when first thinned, going over them again before they become too crowded, and taking out the other half. This is not only a good precaution against grubs and other insect enemies, which are less likely to destroy or materially injure the crop than when only half the plants are left; but it enables the operator at the second thinning to pull out all those that have commenced to run or shoot; and where pigs are kept, the second thinnings will form excellent feeding for them. The after cleaning and working is the same as for turnips; but as shooting stalks

destroy the uniformity and beauty of the crop, they may either be pulled out or the stems cut over as they appear, leaving, in this case, the lower leaves to sustain and continue the growth of their roots.

In choosing varieties, the yellow globes are generally the earliest; and globes of all kinds are the best for shallow soils; while the long yellows and reds usually yield the heaviest crops on superior deep soils. Growers should, however, not only try many different varieties, but different seed-growers' stocks of the same variety, till they become thoroughly convinced as to which is the most suitable for them. For not only will considerable difference in the size, and symmetry be apparent in different growers' stocks of, say the yellow globe or long red, but a greater per-centage of shooting plants will be found in some than in others bearing the same name. Therefore, in thus experimenting, the per-centage of shooting plants, as well as other particulars, should be carefully noted. Given fresh, and in moderate quantities, the leaves are very serviceable, as well as acceptable, for dairy and other stock, more especially when, as in last autumn, grass, vetches, and other green foods were scarce. Methods of preserving them for winter use are also employed, which the length of this article prevents being noticed at present.

THE MANURIAL VALUE OF TOWN SEWAGE.

IN a recent article under the head of "Town Sewage, What is it?" we shewed that the manurial value of its most valuable constituents, namely, urine and solid excreta in their moist or natural condition, together made up a sum of £2, 12s. 11d.; 24s. 8d. being put to the credit of the urine, and 28s. 3d. to that of the solid excreta. On this calculation, 1000 of our population produce annually a money value of £541, 15s. But this is the theoretical side of the question. There comes into the practical side of it, the

enormous quantity of water with which the town sewage is diluted, so that in place of finding we have a value of over £2 sterling a ton, we have not over 2d. as representing that of town sewage in its *ordinary condition*. Not so much as that in fact, for the majority of authorities put it at between $1\frac{1}{2}$ d. and $1\frac{3}{4}$ d. Such is the difference between the theoretical and practical value of sewage manure. Nor need we be surprised at the discrepancy between the two, when we remember that the same in kind

although not in proportion, exists between the theoretical and practical value of farm-yard dung. Some chemists value this at 20s., others at about 12s.—none lower—per ton; and yet we find, that in practice we by no means get such prices for it—happy those who had to sell at such prices, unfortunate those who had to buy! The value of a thing is what it will bring: and, judged by this standard, what is the value, the manurial value, of town sewage? In endeavouring to reply to this question we have to fall back upon the recorded experiments of private individuals, whose love of science has urged them to investigate the details of this important question—upon the labours of professional men who have been employed by the Board of Trade; but in no instance can we fall back upon the results of a complete and exhaustive inquiry instituted by any of our leading agricultural societies. True, in the pages of their *Journals* and *Transactions*, papers have been given bearing upon the point; but it is not papers the public so patiently wait for, it is facts gathered from practice in the field, carried out upon a plan at once widely comprehensive and rigidly scientific. Let us hope that some day or other the authorities of our societies will wake up to consider that there are yet many important questions awaiting them, works which have not yet been attended to as they ought to have been; when they do so, they will discover that the town sewage question is one of them. In making, under the circumstances which we have thus described, an inquiry into the manurial value—or, perhaps, to put it more correctly, the circumstances which affect that value in practice—of town sewage, we labour under this obvious disadvantage, that we, as a rule, have to quote authorities who made and published their investigations some time ago—since which, one or two ardent advocates of town sewage have manure applicable to all crops and under all circumstances, have arisen, who take exception to the results of these investigations, and say that practice should not be dependent, or rather made to be dependent, upon such statements. But to this we have the fair reply, only, if you object, or lead us

to believe that you object, to these statements, you are bound at least to shew us other statements, the result of investigations as painstaking and as scientifically carried out as those you object to. It is really by no means a scientific way to deal with a matter of such vast importance, by merely giving us general statements of the result of experiments, however practical they may appear to be and doubtless are, but of all the details of which, cost as well as results, we are kept in ignorance. We do not dispute the facts you bring before us—we congratulate you upon the results—but what we want to know in the present instance, do these results pay the cost of obtaining them? A momentous question! Such is the case which may be put, and put, as our readers will admit, with all fairness and candour. We are compelled to put them, because, so far as the general experience of the last few years goes, the town sewage question is practically as far from being settled as ever. It is absolutely futile to bring forward, in support of a contrary view, cases in which town sewage is obtainable under circumstances more or less favourable to a successful experiment. What we maintain as imperatively necessary to be shewn, is, are there many cases, or is there one case, in which the trial of town sewage is put precisely upon the same basis as the trials of ordinary manures are put every day?—that is, where the town sewage is supplied on the same commercial footing as other manures are, made to bear all its own expenses; of *purchase at its value*, whatever that may be; of transport to the place where it is to be used, and of the cost of application to the soil which it is to enrich, and to the crops which that soil is to bear. All this may have been done, but we should like, however, to know where it has been done, and with *all* the details as rigidly given as in those of the experiments upon manures, which are published every day. We must not look to the results of experiments made under exceptional circumstances, unless, as for the inevitable result, we are prepared to accept of exceptional results; and these have no right to be pitted against the result of other experi-

which are not made under exceptional stances. We yield to no one in our to see our town sewage utilized, but we

that that utilization will be hastened, tarded, the more thoroughly and the losely the subject is investigated and t to the rigid test of scientific deduc- id practical experience. It will be re- , not hastened, by that loose method unfortunately has been so frequently lified in connexion with its discussion, ing general statements, and coming to cussion with the foregone conclusion must be right and pleasant. This mode ting the "wish father to the thought," io means that by which accurate re- any investigation entered upon can ained.

have said that the value of a thing is t will bring. This value is dependent ircumstances more or less numerous. case under consideration, the value of ire not only depends upon what, as a ng substance it is, as compared with rtilizing substances, but upon the con- n which it is as affecting its transport. ore concentrated a manure is, it is the aluable, not merely because the whole r nearly the whole of it, goes to the nourishment, no extraneous and value- atter being mixed up with it, but be- f the cost of transport from place to

Valuable as we all admit farm-yard o be, there is a limit beyond which ld cease to be valuable at all, in- as the cost of its transport would h more than its fertilizing value. If manure there is a fertilizing value, say es that of farm-yard dung, it is obvious : same result—as a fertilizer—would ined by using a ton of this as ten tons lung. But the cost would be vastly t ; you would have to pay the carriage ns if you used the dung, in place of iage of 1 ton if you used the concen- nanure. But this mode of comparing ure with another is only correct so far as —indeed, in another aspect the com- is wrong, or at least likely to lead to is results—but it is correct so far as

the bulk is concerned, of the two manures. We have, however, to take into consideration this important fact, that not only is the ques- tion of relative bulk to be taken into account, but we must consider whether we can use the bulky manure, as an eminent authority puts it, "when and where we re- quire it." The same authority goes on to say, with reference to town sewage, and to the fact that the difference between its theo- retical and practical value is no more to be lost sight of than the difference between the theoretical and practical value of farm-yard dung. "I cannot see why we should calcu- late the value of a still more bulky manure (as town sewage is), which is still less under our control than farm-yard manure, without taking into consideration the fact, that a manure is only valuable when we can do with it what we want, or valuable in a great mea- sure only to that extent. The fact is, that the more bulky a manure is, the less manage- able it is, and of less practical value it is also." Considerations such as these are eminently practical, and will always affect the sewage question ; but it is not pos- sible, under the present system of town sanitary arrangements, to lessen the bulk of the resulting sewage to a great extent, if indeed to any. This question of bulk is then one to which attention must be paid if we wish to come to a correct conclusion, as to what chances there are of sewage being used agriculturally, in all cases where made, that is, in the neighbourhood of towns. That after the lapse of so many years, so few towns have managed to get rid of their sewage in this way, shews, beyond any cavil, that there are difficulties in the way of using the sewage. And the difficulty is—or rather we should say, the difficulties are—enormously increased, where the local features are such, that special works to overcome difficulties of an engineering character have to be overcome, what these are we shall glance at hereafter ; meanwhile, leaving to another article the consideration of the important point we have opened up in this. On the point of passing this article to press, the Report has come to hand of a meeting of the Society of Arts of

London, at which a paper on Town Sewage was read by Mr Hope. The statements in this paper—to which we shall hereafter closely refer—and those in the discussion which followed its reading, in place of controverting, very fully corroborate what we have above said on the subject; corroborate this very markedly, that in place of the difficulties of the subject having been overcome, we are, to quote the words of one of the speakers “on the threshold of the question, and only just beginning to understand it.” Not very encouraging, certainly, after all these years of “talk,” but nevertheless true, although we have been much blamed for saying the same thing.

Following up these considerations, we have to remark, that the difficulties attendant upon the bulk of a manure are much increased if, in addition, there are present in it many or some constituents which are in themselves valueless, or of comparatively little value. There is in town sewage one constituent of this kind, namely, water. Now, about this constituent of sewage a vast deal has been said, and not always said with a just or accurate view of the part it plays in its utilization, and the influence it has on its value. Doubtless the water of sewage is valuable as a vehicle not only by which it may be conveyed from the town in which it is produced to the country where it is to be used, but by which it can be applied with comparative ease to the surface of the land which it is designed to fertilize. But these advantages may be purchased at too great a price; that they are so we have all along maintained; for, however much the fact may be kept out of sight by those who are determined to take nothing but a favourable view of the value of town sewage, it is nevertheless the fact that the enormous quantity of water present in town sewage does tend to reduce, to a very great extent, its manurial value. That value, as indicated per theory, we do not, nor never have denied, or wished to deny; on the contrary, we felt that we might safely give to it a higher value than even its most enthusiastic advocates were disposed to give to it, and yet be able to maintain that that

value was so much lowered by the large volumes of water with which the fertilizing constituents making up that value were mixed, that practically this was the difficulty with which, nationally, we had to contend. All experience has gone to prove the correctness of this view; and we maintain, that so long as the present sanitary requirements of towns necessitate—or are presumed to necessitate—the continuance of this system, so long will the difficulty remain; and so long will we find, that while here and there we may carry out cases where town sewage is applied to agricultural purposes, these will only be exceptional, and the great bulk of sewage will not be used. We have said that there are those who hold that the large quantity of water with which the fertilizing constituents of sewage are mixed, does not affect materially the value of it. Thus, Mr Hope, in the paper read before the Society of Arts, to which we made brief allusion in our last article, says on this point, after giving the value of the town sewage per head of the population at 8s. 8d., “the amount of water in which this is conveyed can only affect in a very minor degree its value as a manure.” To prove this statement—which runs counter to all that scientific research has shewn on the subject—Mr Hope proceeds to shew that there is an “enormous practical advantage” in the “ease and convenience with which” sewage can be applied to “all growing crops,” and not only to growing crops, but to fallow land and to meadows, so that by using it in this comprehensive way—a way which we shall hereafter shew is not believed to be practicable by some, and these eminently practical farming authorities—the full value of the manure may be obtained. But here we take leave to think Mr Hope takes two things essentially distinct, and treats them as if they were one and the same thing. The value of the sewage *per se*, and the mode in which that sewage can be used, and that value fully obtained, are quite two different things. For here, at this point, Mr Hope, and men of science who have studied the question fully, join issue. The question with them is not, whether Mr

can use the sewage in such a way that it gets the full value out of it, but it is, *is the value?* Mr Hope puts it at a much higher figure than they do. By means disputing that sewage theoretically, an per analysis, has the value Mr Hope upon it—they maintain that the contents which make up that value are mixed with such a vast quantity of water, that they are worth, in practice, the amount which theory analysis shews they are. Thus, Mr B. H.

the eminent chemist, to whose views Mr Hope in his paper took such marked exception, puts the matter thus: Every chemist says, "emphatically pronounces the presence of the very large mass of water that of reducing the practical value of ammonia below the value it has in manures containing such an amount of ammonia for instance. In this case, ammonia is at say 8d. per lb., but a lb. of ammonia in sewage is not worth 8d., because 10,000 lb. of water mixed with it creates some difficulty in getting the ammonia upon the land, and a still more serious difficulty in making the ammonia remain in the ground." With reference to this point we more than once, in discussing it, stated that it is such a thing as purchasing gold too cheap as some mining companies who have sold quartz have found to their cost. No disputed the fact that the quartz did not congeal, but the cost of extracting it was more than the value of the gold. We find Mr using the same figures in another way, quoting the price of gold at £4 per ounce, the fact that the Rhine sand contains gold leading to the inference that the gold cannot be obtained from the sand except at a cost greater than the value of the gold. Then, Mr Hope quite puts out of court all speculation as to the item of transport of the sewage—an item which must be legislated for. It is not the case that the sewage of towns is always used in their *immediate* neighbourhood, thus dispensing with the cost and trouble of transporting it; the distance, even in the most favourable cases, must be somewhat considerable, and that will have to be paid for, granting that it is taken to the fields

free of expense, can we allow that there is no expense to be incurred in the appliances made to distribute it over the surface of the land. True, it is stated that the expense of doing this is very trifling; so trifling that the profit made out of the application will more than cover this, and yet leave a handsome return. Leaving this point, upon which we may yet have something to say, we would, however, return to the question, what is or will be the influence of the bulk of the sewage upon the transport to distant parts. That in some instances the land to which the sewage has to be applied must be at a distance, is obvious enough. Land cannot be obtained in the immediate neighbourhood of towns of sufficient extent to enable it to be utilized. Thus Mr Hope estimates, that for every twenty to twenty-five persons in a town, the population of which is increasing, one acre must be secured upon which to apply the sewage obtained from them. Now, let us ask the question gravely of our readers, where is the land, for example, at this rate to be obtained for a city like London, like Manchester, like Liverpool, or Glasgow? We do not know whether the estimate is made upon the same principle as that adopted by Mr Hope; but with reference to the latter named city, Professor Way estimates that it would require 10,000 acres constantly in use. Nor would the difficulty of obtaining such enormous acreage of land in the immediate neighbourhood of towns be lessened, but immensely increased, by the fact that, in order to give the sewage application the best chances of success, the question of the quality of the land required is another point to be attended to; for Mr Hope says: "The land chosen should, if possible, be a light loam, because this is more easily cultivated, and better suited to the rapid growth of market garden vegetables, not from its chemical composition—for with plenty of sewage this may be disregarded altogether—but from its physical condition, which admits of the delicate roots of young plants striking out more rapidly. The land chosen," moreover, he continues, "should, if possible, either be flat, or should consist of wide gentle slopes.

Frequent and rapid slopes should, where practicable, be avoided." Now, on all these points we shall have yet something to say, treating them from a farming point of view; but we content ourselves with asking the reader if there are not conditions enough here, both in the quantity of land required, and the physical constituents and formation of it, which bring forward, in a way which no man of real science can overlook, the question of transport of this same sewage, if, to save us from the charge which Mr Hope brings against us, as a nation of very reckless wasters

of a highly valuable substance, it must be used. This question, then, of the cost of transport is, as an authority well puts it, "the most important item"—all the more important when we maintain that its value is very much less than is claimed for it—a value put down by this same authority at only *one penny per ton*; but who, at the same time, most suggestively says, "there appears to be no doubt that the farmer will not give a half-penny a ton for it, delivered free of expense." We are inclined to think he is right. What do our farmer readers say?

COST OF STEAM CULTIVATION.

BY MR J. J. MECHE.

IN the 300 and odd pages of vol. 3, part 1, of the "Royal Agricultural Society's Journal" (new series), devoted to steam cultivation, we have reports (which every farmer should read) of the actual working and cost of steam culture on 140 farms, comprising 60,000 acres of land in various counties, which were visited by the Society's committees. Here we have trustworthy data for a correct conclusion as to cost of the various operations under differing circumstances. The steam cultivating apparatus, like our drills and some other machines, being only in use for a small portion of the year, it becomes necessary to charge a whole year's interest on their cost. This has been done in every instance by the committees, who have also very properly added $7\frac{1}{2}$ per cent. for depreciation. These two items (together, $12\frac{1}{2}$ per cent.), divided among the number of working days, give a daily charge on the work done, varying with the cost of the apparatus, the area and depth of cultivation, the nature of the soil, and the style of management. Its average may be about 6s. per acre of ploughing—repairs, coals, oil, water, and labour, costing also about 6s. per acre. Where the engine is used for threshing or other purposes, they go in diminution of

the interest. Unlike horses, which are available and required almost every day, the cultivating apparatus must lie idle nine months out of the twelve.

The average capital which I employ in my horses (seven) is £152, as follows, extracted from my stock-taking account. My land, 170 acres, is all arable, except 14 acres in permanent pasture:—

1864. Seven horses, value	.	.	£124
1865. " "	.	.	154
1866. " "	.	.	130
1867. " "	.	.	167
1868. " "	.	.	179
1869. " "	.	.	170

£924

Average annual horse capital, £132; average value of each horse, £19.

Amount of Work done in 1869.

Ploughed	.	.	acres, 135
Double or trench ploughed with seven horses, $15\frac{1}{2}$ acres, equal to	.	.	" 50
Broadsharing or cultivating	.	"	84
Acres	.	.	269

It appears to me that I have to charge the 269 acres ploughed and cultivated with the cost of keeping seven horses for sixty-five

ng days and ten Sundays—total seventy-ays, at £50 per annum for each horse s attendants, which brings my cost of ation to 6s. per acre, the drilling, harrow- and rolling, being an extra charge. horses are employed only about sixty- days in ploughing and cultivating, uring the rest of the year they are fully oyed in harrowing, rolling, drilling, g, carting on manure, and carting off rops of hay, corn, and roots—carting hay, and straw to market—carting coals ed engine, cake and food for stock, and ing reaping machine; our horses have few days' rest in the year. In fact, they ery severely worked, but as soon as their is done, they are kept quiet in their es, their food all prepared in their ers, corn ground, hay and straw cut haff, roots (when they have any) pulped, sometimes some oilcake. They are ely ever turned out, except, perhaps, a lays in harvest. I see that last year they d to the land nearly 800 loads of manure, brought to the homestead 300 tons of and straw, also the hay and roots and crops, probably 500 tons; besides the ing of mangold from clumps, and hay traw from stacks, carting food to sheep lds, and many other necessary jobs. It be remembered that all my land has broken up very deeply—some twenty ears ago—some of it being broken up nine horses, and other portions dug y. One-tenth is ploughed deeply annually seven horses, so that my land is in a very ent condition from the ordinary shallow hed soil with a pan 6 inches below the e. It does not appear, therefore, in my that I should be a gainer by using the -plough, except by hiring for a short immediately after harvest to save time. lging from the Society's report, one-half ost of steam cultivation arises from a interest and depreciation (12½ per being concentrated upon so small a n of the year as 70 days. In my case, hole year's interest and depreciation on otive power (horses) would only amount, ½ per cent. annually on £132, to

£16, 10s., or 1s. 1½d. per day for 300 work- ing days, or under 3d. per acre. The time may probably come when a farm of 640 acres shall be in form 1 square mile—where a fixed engine in the centre shall be able not only to pump its own water, but do all the cultivating by means of a mile or so of rope; or, better still, when Mr Thomson's indiarubber tired engine, or "G. A. H.'s" engine, with flat-footed wheels, shall do all that horses are required to do, and so be constantly employed.

It appears to me that on a small farm where a certain number of horses are required for drilling, harrowing, and rolling at seed time, and also for harvesting, that it is best to hire; and that a steam apparatus pays best where it can displace horses as cultivators without inconvenience to the other requisite operations. This was also the opinion of the committees of investigation. There is a time immediately after harvest when it may be necessary or desirable to thresh corn and cart it to market. It is at this time particularly that the steam-cultivator is required, even on small farms, and a hiring for such purposes will pay. I know of a market gardener who, with 50 acres of ground, has a fixed engine for cultivating in the centre of it: so rapid is his succession of crops, that it is economy of time that caused him to purchase the engine; although he has an abundant supply of hands for digging, he finds the engine most expeditious and profitable. The breaking up of ill or shallow-ploughed land, where there is a pan under the ploughed soil, is always best done by steam-power. All my land was very deeply disturbed 25 years ago, having been drained two or three years previously. Great loss arises from being behind with one's work. Steam-cultivators hired or bought will remedy this evil. As we double-plough or trench-plough in the spring or summer, as soon as any ground is clear of tares, &c., our horses have seldom much slack time. I observe by the committees' reports that steam-cultivation does not shew equal results where the land had been previously deeply cultivated and well farmed. This is what might be expected.

Another reason why a steam cultivator on my farm would not pay is, that I have a fixed engine for grinding, threshing, chaff-cutting, root-pulping, cake-breaking, sack-lifting, pumping, and seed-crushing.

I see by the committees' reports that the price for hired steam cultivation is as follows:—Breaking up stubbles once, 12s.; with plough or digger, 17s. 6d.—the farmer finding coals, water, carting, and extra hands. In my neighbourhood the charge per acre is about 12s. for a single cultivator, or 20s. for

a double cultivator, on the same field—besides coal, water, carting, &c. To this we should add the cost of several harrowings and rolling—before our seed-bed is complete.

My success as a farmer depends mainly on the fact that the farm has been put into a condition favourable for the employment of capital.

Although I strongly advocate very deep cultivation for roots or green crops, it is not desirable immediately preceding the wheat sowing.

REPORT ON STEAM CULTIVATION.

BY LORD KINNAIRD, ROSSIE PRIORY.

THE importance of steam cultivation will be admitted by all who have given it a fair trial, especially on clay land. The value of deep cultivation on all lands, where the soil will admit of it, is undeniable; and deep ploughing can never be done so effectually and cheaply as by steam-power.

Another great advantage of steam-power is

* The following letter, from Lord Kinnaird, addressed to Mr Menzies, the Secretary of the Highland and Agricultural Society of Scotland, will explain the appearance of this article by his Lordship:—

ROSSIE PRIORY, N.B., Feb. 26, 1870.

DEAR SIR,—I did not make any return, as requested by the Directors of the Highland Society, of my experience in steam cultivation, because I felt that I could not at the time give a fair and complete one. Like all new inventions, particularly that connected with agriculture, where machinery is subject to so many contingencies, it takes some time to ascertain how to meet these, and breakages frequently occur to weak points of the machinery, still I felt more and more satisfied every year that cultivation by steam would be very highly advantageous. At length, having gained experience and found out the weak points, I commenced in the spring of last year to keep an accurate account of work done, and all expenses incurred, and now I have much pleasure in sending you a report of the result of a year's work, and am enabled to recommend highly the system of steam cultivation, provided always that the implements are carefully and *substantially* turned out, and all parts, even to the bolts and screws, made of the *best quality of iron*. I have no doubt that, in spite of the *first cost* being heavy, that cultivation by steam-power will soon become more general.—Yours faithfully, KINNAIRD.

the rapidity with which the work can be carried out. This is especially important for spring work in Scotland, where, with its variable climate, it is most important to take advantage of favourable weather to get in the crop, as it may make all the difference of crop or no crop. For autumn cultivation also, it is valuable, for whilst the harvest is in progress the steam plough is at work, following close on the removal of the crop from the field. In winter it is not less so, as the engine can work when horses cannot get on the land.

The only drawback is the "first cost." The results given below are those of the work performed by "Fowler's Double Engine."

The "Double Engine" I now believe to be the best system; but I at first tried Howard's "Tackle," and Fowler's "Clip Drum and Anchor," either of which, for a farm of from 300 to 1000 acres, and large or square fields, would do the work at less original outlay. The objection in this case is, that they require more men, and that it takes half-a-day's work with extra horses to set the machinery going; whereas, in the case of two engines, they can be set to work in twenty minutes, and are specially valuable for small and irregular-sized fields.

The difference between steam machinery

(one engine) and stocking with horses would, in the first instance, be about a-half more for steam; but taking into account the fact that, at the lowest estimate, all the horses would require to be renewed once during a nineteen years' lease, the difference is not so great as would at first appear.

Assuming the cost of engine, 14 horse power, and the implements at . . .	£1100
The saving in stocking a farm would shew thus—a fixed engine and buildings	£150
On a large farm requiring 7 or 8 pairs of horses, 4 pairs at least may be saved.	
Thus cost price, with harness, at £90 per pair	360
And a second set during a 19 years' lease	360
	870
Excess for steam cultivation with single engine	£230
Excess with two engines	730

In a larger farm the cost of horses in saving would be greater, taking into account the very important item that the *steam horse* does not *eat* when not at work. The wear of wire rope is much greater with the clip drum, and in stony ground, than in clay. My present rope has been in use for three years, and is perfectly good. To replace this, and to keep the steam machinery in repair throughout a whole lease, so as to leave it at the end in good condition, my experience of nine years enables me to state that a sum of from £25 to £30 per annum would be sufficient, and this bears no comparison to the wear of horse flesh, without taking into account casualties which frequently occur from horses standing idle in frosty weather, and then being hard wrought in the spring. Thus the steam-power, though at first apparently more expensive, is in fact more economical. The machinery is managed by one intelligent labourer, with a man and two boys under him. In stony ground where "porters" are required, a third boy would be necessary. These can work on the farm when not engaged with the steam plough. I subjoin a carefully prepared statement of cost of implements, the expense of working, and the amount of work done in twelve months—spring and autumn culti-

vation; but the amount of work performed might have been one-third more at no increase of expense had I used the 6 or 8 furrow-plough and 9-tine cultivator, taking a greater breadth, which, for all level lands, should be adopted.

However great the advantage of steam cultivation as shewn by this statement, not taking into account the increased crops produced, the difficulty still remains—"the first cost."

This can only be met, in the case of small farms, either by a company to let out steam machinery, or by two or three farmers joining in the purchase of a *set*. Then, again, arises the question, Who is to get the use of it, as in spring every one might require it at the same time? To meet this difficulty, the number of acres for each set of double-engine machinery should be limited, and should not, in my opinion, exceed from 1000 to 1500 acres, the work of which could be accomplished by a single set of double-engine machinery, with full-sized ploughs and cultivators, in sufficient time to allow each farm to get its fair share of the work.

LAND CHIEFLY CARSE OR CLAY—FIELDS FROM 10 TO 20 ACRES.

IMPLEMENTS IN USE.

2 Fowler's 14 horse-power engines	£1200	0	0
450 yards wire rope	47	0	0
4-furrow balance plough	97	0	0
7-tine balance cultivator	70	0	0
Large harrow	55	0	0
Croskill's roller	20	0	0
Water barrel	25	0	0
12 cast-iron shears	0	12	0
12 steal breasts	9	0	0
6 steel shives	12	0	0
12 digging breasts	2	8	0
Total cost of implements	£1538	0	0
In case of single-engine cultivation—			
Deduct—Cost of one engine	600	0	0
	£938	0	0
Add—Cost of anchor	£55		
Extra wire rope	42		
Porters	25		
	122	0	0
Total cost of implements	£1060	0	0

STEAM CULTIVATION—SPRING, 1869.

Where Working.	Acreage.	Description of Work.	Coals Used.	Time in Field.	Depth of Work.	Remarks.
			Ton. Cwt.	Days.	Inches.	
Durdie.....	30	Digging for barley.....	4 0	3½	7	
".....	31	Grubbing.....	3 0	3	7	Half day stoppage, loose bush.
Inchmichael...	10	Harrowing.....	1 3	1¼	5 or 6	
".....	12	Do.	1 3	1¼	5 or 6	One day putting on spur.
Kingston.....	10	Ploughing.....	2 0	2	6 or 8	
".....	11	Croskill rolling.....	0 8	½	6 to 8	Half day cleaning boiler.
".....	21	Harrowing.....	2 0	2	6 to 8	Half day repairing blast pipe.
".....	21	Grubbing.....	2 0	2	6 to 8	
".....	21	Croskill rolling.....	1 2	1	6 to 8	All one field.
".....	21	Grubbing.....	2 0	2	6 to 8	Gone over seven times.
".....	21	Harrowing.....	1 2	1	6 to 8	Harrowing, grubbing, rolling.
".....	21	Croskill rolling.....	1 0	1	6 to 8	
".....	21	Harrowing.....	1 0	1	6 to 8	
".....	14	Grubbing.....	1 10	1½	6 to 8	
".....	14	Harrowing.....	1 2	1	6 to 8	Half day cleaning boiler.
".....	14	Do.	1 0	1	6 to 8	
".....	14	Croskill rolling.....	1 0	1	6 to 8	
".....	14	Grubbing.....	1 2	1	6 to 8	
".....	14	Harrowing.....	1 0	1	6 to 8	
".....	14	Croskill rolling.....	0 8	½	6 to 8	
L. Powgavie...	12	Harrowing.....	1 10	1½	6 to 8	Half day cleaning boiler.
".....	12	Grubbing.....	1 10	1½	6 to 8	
".....	12	Harrowing.....	1 0	1	6 to 8	
".....	12	Grubbing.....	1 8	1½	6 to 8	
".....	8	Ploughing.....	2 0	1½	6 to 8	
Inchture Mains	14	Grubbing.....	2 0	2	6 to 8	
".....	11	Do.	1 0	1	6 to 8	
".....	14	Do.	2 0	2	6 to 8	
".....	14	Harrowing.....	1 0	1	6 to 8	
Unthank.....	10	Grubbing.....	1 3	1	6 to 8	Half day cleaning boiler.
".....	10	Harrowing.....	0 17	½	6 to 8	
	478		44 8	43½		

STEAM CULTIVATION—AUTUMN, 1869.

Where Working.	Acreage.	Description of Work.	Coals Used.	Time in Field.	Depth of Work.	Remarks.
			Ton. Cwt.	Days.	Inches.	
Inchture Land..	17	Ploughing.....	3 10	2½	8 to 10	Two days repairing ropes, &c.
Ballindean.....	15	Ploughing for beans.....	2 2	2	6 to 8	
".....	15	Ploughing for wheat.....	2 2	2	6 to 8	
".....	9	Digging for turnips.....	1 3	1	10 to 12	
".....	6	Do.	1 0	1	10 to 12	
".....	12	Grubbing for wheat.....	1 5	1	7 to 8	
".....	20	Digging for turnips.....	5 0	3	8 to 10	Half day cleaning boilers.
".....	12	Ploughing for beans.....	2 10	2	7 to 9	One skiff broken.
".....	21	Do.	4 8	3	7 to 9	Two guide-pulleys broken.
".....	21	Digging for turnips.....	5 0	3	9 to 10	Half day repairing ropes.
".....	20	Digging manure in for do.	4 10	3	10 to 12	Half day cleaning boilers.
	168		32 10	23½		

Days amount	Day in winter months from 7 to 8 hours ;
£0 8 2	in summer from 10 to 11 hours.
£0 6 0	Total cost of lost time during the year .
£0 1 6	Tradesman's time, 10 days at 4s. .
£0 15 8	Cost of hose-pipe, and repairs to machinery, pump, and water-barrel .
	£12 15 0
	2 0 0
	11 16 7
	£36 11 7

*THE TENURE OF LAND IN ENGLAND.**

BY MR W. MANFIELD.

WHILE the attention of the country has been much occupied of late with the tenure of land in Ireland, it has occurred to me that the tenure of land in this country is a topic that may be profitably discussed. I have, therefore, selected the Tenure of Land for my subject, or rather that branch of the subject which relate to the conditions upon which land is let by landlords to tenants. The remarks will apply principally to the tenure of light land, of Suffolk, and to heavy land. I believe the great bulk of the land in this country is let upon lease, or from year to year, subject to six months' notice to quit, and to be let upon the four-course system, or according to the custom of the county. I estimate the tenants' capital at about one-third of the value of the land; thus a tenant has about £10 per acre capital to farm worth £30 per acre. If the land is light and worth less, probably it requires less than its capital to farm it. On the other hand, more valuable land often requires more than its capital to farm it. It may be said I have put a low value upon land, but I am speaking of an average description of land subject to tithe, land-tax, and other expenses. Now, what security has the landlord for his capital? What security has the tenant? The security held by the landlord is the land; he receives his profit and rent, as usual; half-yearly; in the case of insolvency or bankruptcy of a tenant, the landlord has a claim before all ordinary creditors—he will be paid in full before ordinary creditors have a farthing. In ninety-nine cases out of a hundred, the tenant's valuation exceeds half-a-year's rent; in fact, it is next to impossible for a landlord to lose any of his capital. The security for the tenant's capital appears to me to offer a striking contrast to the landlord's.

Read before the Lavenham Farmers' Club.

A yearly tenant upon entering a farm must expend a large amount of capital which he cannot call in at six months' notice; he may improve the farm by using large quantities of oilcake, or other feeding stuff, by altering the fences and buildings, by making many improvements "such as to add to the letting value of the holding, and further, such as shall be suitable to the character of the holding," which is Mr Gladstone's definition of improvement. He may have his landlord's word that his (the tenant's) capital is as safe as if the land belonged to him, but—leaving out of the question other things which may cause the tenancy to be abruptly terminated—the landlord may die; the estate may be sold; the purchaser may buy for occupation, or otherwise; in either case, a change of ownership would take place, probably a new valuation would be made, the improvements made by the tenants would not be recognized, the tenant would have to pay a considerably increased rent upon his own capital, or leave the farm, in which case the custom of the country would give him nothing for the improvements he had made—or the tenant himself might die, his successors wish to give up the farm, in that case the custom of the country would give them nothing for unexhausted improvements.

A tenant farming under an ordinary lease enjoys much greater security for his capital; he feels that in laying out his money he is making a safe investment; but when the lease is drawing to a close, he feels that his capital is unsafe, he withdraws what he can from the land, the land produces less than it might, and why is it so? Because the security for his capital is lessened; he then has no greater security than if he farmed from year to year.

I have endeavoured to point out to you that while the landlord enjoys perfect security

for his capital, the security for the tenant's capital is very unsatisfactory, that the land does not produce what it otherwise might, and therefore that the present system of tenure is not good. I will now suggest to you some alterations that I think may be made in the hiring and letting of land that may be beneficial to parties interested.

I believe one of the greatest drawbacks to the improvement of agriculture is the uncertainty of the tenure of the occupier and the insecurity of his capital. The land suffers, not so much for want of capital as for want of security for that capital. My own opinion is that all land should either be let upon lease or upon a well devised system of tenant-right. I prefer leases, because they give greater liberty to the tenant in the way of cropping than may be given under a system of tenant-right. I conceive that lease to be the best which will secure the best rent to the landlord and the greatest profit to the tenant. A lease should contain nothing which restricts the tenant and does not protect the landlord. I have drawn up a lease upon which I will proceed to make some remarks. I feel it is imperfectly worded, and open to many objections, but upon its principle I should be willing either to hire or let land. I have endeavoured to keep in view the landlord's rent and the tenant's profit. I will bring before you the points in which it differs from many. From the list of reservations, pollard trees growing upon, or in fences adjoining arable land, are excepted; the exclusive right to game is reserved to the landlord with certain exceptions, to be spoken of hereafter; if by fair and legitimate sport we can keep our landlords and country gentlemen living amongst us, it is desirable to do so; it contains a provision that 't shall not be terminated without two years' previous notice in writing from either party, hereby always encouraging the tenant to keep the farm in as good a state of fertility as possible, at the same time reserving to the landlord the right of making any alterations he pleases, giving the tenant a fair notice of his intention to do so. If at the end of a long lease, a farm is of more value than it

was at the beginning, I contend it is better for all parties to come to an arrangement as to the future some time before the end of the unexpired term. And I will go so far as to say that if a landlord refused to come to terms as to the future, two years before the expiration of a lease, I should take as much as possible out of the land, or put in as little as possible; if, on the other hand, a tenant would not come to reasonable terms, I should feel perfectly justified in giving the offer of the farm to another when the lease had nearly expired. I do not think a tenant can benefit himself by lowering the condition of his farm for a longer period than two years before the termination of his lease.

Clause 2 authorizes the tenants' executors to assign to any responsible person, if the landlord shall decline to take the tenants' interest at a valuation, which is but fair. We often see that, upon the death of a tenant, the farm has to be surrendered, notwithstanding the lease, and, as I before remarked, the custom of the country allows nothing for many unexhausted improvements.

Clause 3. The tenant to have a pecuniary interest in keeping up the repairs, he paying for half the labour in keeping the buildings, &c., in repair, and all the labour in keeping gates, &c., in repair. All the first to be put in repair by the landlord, and all materials to be found by the landlord.

Clause 8 allows the tenant to sell any article grown upon the farm, such as straw or roots, upon condition that he buys back an equivalent in oilcake or feeding-stuff. I think it most desirable that the tenant should be able to do this. He can frequently sell straw or roots for more than they can be possibly worth to him for consuming or foddering purposes. It is fortunate that most of you gentlemen are farming your own land, or you would be in a fix in disposing of your sugar-beet grown upon wheat stubbles. I contend that the land is more benefited by the corn or cake purchased with the money arising from the sale of roots, or straw, or hay, or clover (if they can be disposed of advantageously, as they often can), than it would be by the articles themselves. I think this liberty

not be extended nearer than eighteen months to the termination of the lease, which ensure that all the produce grown upon the land (except the corn, grass, or seeds) in the year next preceding the termination of the lease, should be consumed upon it.

Clause 9 gives the tenant liberty to farm the land in any way he pleases, except the last two years, when it must be farmed by a four-course system. It is here that the landlord has the advantage over the tenant.

With the lease it is the tenant's direct duty not to injure the land; he cannot improve it and give it up, but must keep it on.

Clause 10 considers liberty of cropping to be an advantage, as he can then plant a large quantity of anything that sells well, and he can have as little as he pleases of any crop which sells badly.

Clause 10 provides that if either landlord or tenant desire it, the landlord must provide for draining, and can charge the tenant the cost of an efficient man to see that the work is properly put in.

Clause 16 provides that if any straw is destroyed by fire, the value of such, at foddering, shall be laid out in the purchase of additional food, to be consumed by stock, or in additional manure to be used or left upon the land.

Clause 17 provides that the tenant may hunt hares during the coursing season; that he may kill the rabbits (except in April, May, and June) at any time, or in any way that will not interfere with winged game. If this was generally adopted it would wonderfully lessen the quarrels and ill-feeling which subsist, and might not, between landlord and tenant. My experience of rabbits has been somewhat extensive; for several years the damage done by them on a comparatively small farm exceeded £100 a-year, during which time the landlord persisted in saying there was nothing to be done. I suffered so severely that had any alteration been made I should have let the farm up; but after a bit I was obliged to kill the vermin; the landlord was surprised at his surprise that there were so many rabbits.

I afterwards had a lease of the same farm with a right to kill rabbits if they did

me material damage. I was never troubled with them after. I cannot believe that a landlord would preserve such vermin if he really knew the damage they do; they are the greatest pests a farmer has to contend with. I may add, I hired my farm upon the understanding that there were to be no rabbits to cause injury.

Clause 19 provides that the straw, and chaff, and colder arising from the last year's crop of corn, threshed before the expiration of the lease, is to be thatched, the thatching to be paid for by the incoming tenant. Before the lease is forfeited for non-payment, the rent must be demanded, and before the lease is forfeited for the breach of any stipulation, it must be shewn that the tenant will not submit to any award of arbitration.

Valuation Clause contains the usual conditions, except that it provides that the cost of draining is spread over a greater number of years than usual—

Of 30 inches deep, 3 years.

40 " " 5 "

48 " " 7 "

The greater the depth the greater the cost, and the greater the efficacy and durability. Therefore, in future, the time should be extended. I have inserted the usual conditions as to threshing and carrying out the last year's corn, but I think they may be improved upon in this way. Let there be a fixed charge, say of 1s. 6d. per coomb for threshing and carrying out last year's crop of corn, and 1s. 6d. per bushel for trefoil, and 2s. 6d. per bushel for clover seeds. If the outgoing tenant cannot come to terms with the incoming tenant about the carriage, &c., he can get some one else to do it for him. I have heard valuers say that the threshing is often more bother than all the rest of the valuation account.

The Mutual Clause contains a provision in case of a dispute arising as to the meaning of any part of the lease, and it provides that it shall be submitted to arbitrators who shall have power to settle it. An equitable system of tenant-right, with two years' notice to leave, whereby the tenant on leaving a farm would be compensated, in addition to the customary valuation,

tion, for all unexhausted improvements, as well as a portion of the oilcake consumed by cattle or sheep upon the farm during the last three years of the tenancy, would be a great improvement upon the year to year system, and upon the leases usually given. If either of these improved systems of letting land are carried out, the following advantages would follow:—More respect and more rent to the landlord, and to the tenant more security, more comfort, and more profit. I have left unsaid much that I might have said on the subject. I could have mentioned names and given you illustrations of the injurious working of the present system. Of this I am certain, that so long as tenants have no better security than they now have, so long will the land be farmed worse than it ought to be, and worse than it would be if a better state of things existed.

THE DISCUSSION.

Mr R. HAWKINS said: The tenure of land in many parts of the country might be vastly improved, and he agreed with Mr Manfield that a lease was the best arrangement that could be entered into between landlord and tenant. If a tenant could take his farm on a lease with a fair rental, he had far greater security for, and better opportunities of, investing his capital with greater benefit to himself than under a system of tenant-right. Under the four-course system a man was cramped in many ways, but under a lease, as described by Mr Manfield, the tenant would farm so as to obtain the greatest benefit for himself, and so would benefit his landlord also. In his opinion, a good lease and a good understanding between landlord and tenant was the finest thing for the country that could possibly be. It would be much better for every one if the liberty they enjoyed in this locality were more wide spread. He himself was under the four-course system, but his landlord said, so long as he farmed well, and kept the land pretty clear of weeds, he should take no notice. What they wanted was a better understanding between landlord and tenant, and if this existed more widely, more corn would be grown, and the farmers would receive more benefit. Another point referred to was game; they were not overstocked with game in that district, but when game was allowed to get a-head, he did not know anything more injurious. He had no doubt many of them would agree that the Legislature ought to interfere and not allow tenants to be overrun with game under any circumstances, whether the landlord interfered or not. As to rabbits, he thought they should be considered as vermin, the same as rats, and destroyed.

Mr T. P. HITCHCOCK said they were following the same line in discussing this question, but he was not

quite sure whether it was policy on their part to discuss this sort of subject. The question divided itself into two parts—one, which might be termed legislative, where they asked for state aid, and the other, which was a question between landlord and tenant, and where their object was to give information for the benefit of both, for of course the Legislature could not interfere to say what was a fair rent. The law of contract must remain as it was. There were two parties to it, each capable of making a bargain, and they must be allowed to make it without the aid of the Legislature. The principle must always remain the same, that a man might do as he liked with his own so that he did not injure his neighbour. The law of hypothec, or what was called here the law of restraint, was a question upon which the interference of the Legislature might be invoked, if it was not a just law. There were people who said that the landlord should not be allowed to step in and take everything he could find upon the farm in payment of his rent, without reference to the claims of other creditors. Whether the law was right or wrong was another point. For his own part he questioned whether it tended to the general good, as in his opinion a landlord would be more careful in selecting his tenants, and would take care to get respectable men if he had not this law ready-made to his hand. But now the landlord said, "I don't mind who the man is; he who pays me the highest rent is the man I want, as I am sure of finding my half-year's rent upon the farm." He thought that this was a law which might be repealed with benefit. Mr Manfield had dealt gently with the question of game. Some people talked as if the Game-laws were peculiar to England, but they would find upon inquiry that they existed in other countries as well, and the law said everywhere that the game belonged to the owner of the soil. Indeed, what other inducement would there be for a gentleman to remain in the country if he could not have his country sports. He thought, however, that the Game-laws ought to be restrained within proper bounds. It was a great hardship where a farmer hired land on the understanding that only a moderate quantity of game was to be preserved, and then the landlord afterwards let the shooting to some one else; perhaps it might be that the landlord died, and the next man, not caring about the shooting, let it to some one, a London stockbroker perhaps, who, having no land, did not care a bit about the tenants, and the farmer had his crops destroyed by the abundance of game. Where a tenant-farmer had hired his land on certain conditions and his crops were injured, he thought the Legislature should step in, so that he was recompensed for all his losses. The rest of the paper was suggestions, as it were. It was improved culture that they required, and this they would bring about by some of the clauses noticed in the paper. If they could shew the landlords that it was for their interest to let farms differently to what they were now, either by the two years' notice or any other way, and if they could

shew that it would be an advantage for the tenant to be allowed to sell his roots, &c., off the farm, then they certainly should do so, but it was not a matter upon which they could ask for Legislature interference. Let them endeavour to shew that by dealing differently with the land it would be improved, that the tenant would be able to pay a higher rent and yet benefit himself, then undoubtedly the result would be good. But the Legislature could not be asked to interfere, for who would live in a country where the landlords were obliged to let their land on a lease. Another point had been quite lost sight of. They had heard that there should be a tenant-right under which the tenant should be paid for his improvements, but he thought there should be a landlord-right, by which, if the tenant injured the farm, the landlord could claim compensation, and the amount should be fixed by arbitration too, the same as in the case of the tenant. Then as to rents, they could not have them fixed by any authority. In olden times there was what was called an assize of bread, at which the magistrates or some other local authority fixed what the price of bread should be in a certain place; but that would by no means suit modern requirements. They did it to a certain extent in their Union contracts, but then that was a matter of contract. But he did not think they could make this matter of leases compulsory. It was a matter to be left to the common sense of the people; and, after all, they must remember that no one was obliged to hire a farm, and in doing so it was simply a matter between him and his landlord. Certainly the competition for farms was increasing, but then this was the case in every other branch of trade, and they could not make any law to regulate or alter it. But still they might, as suggested by Mr Manfield, improve the system of culture and the rotation of crops, allowing a tenant to dispose of his crops to his best advantage, so that it was done without deteriorating the land. He must congratulate Mr Manfield upon his able paper, and if well considered, he felt sure they would derive benefit from it.

Mr BIDDELL said, he had come to the conclusion that the absence of tenant-right did not materially interfere with farming operations; of course there was no interference in the case of men who farmed their own land; and yet in riding through the country he did not find that the former were better farmers on the whole than the tenant-farmers. This, in his opinion, was to be accounted for by the fact that so many people aspired to be owners who had better have been content with their position as tenants; for they cramped themselves to make the purchase, and had not the means left to highly cultivate their land. This would account in some degree for the bad way in which their yeomen treated their land. He did not think, however, that the tenant-right was anything like what it should be. He thought the complaint was where the law *was* allowed to step in, where there was no agreement, and where six months' notice was sufficient to eject a tenant. This was extremely

prejudicial to good farming, where there was the least likelihood of this notice being given. If a man was farming up to the mark he could not get his expenditure out of the land in six months, and he should like to see the time of notice extended to twelve months at least. As to leases there was a good deal to be said. Where a farm was not likely to come into the market a lease did not matter, but a farm was much depreciated in value, if put up for sale, by the tenant's having a long lease of it. For instance, if he was an owner having only a life interest in an estate, he should do his next successor a serious injury, if a sale was contemplated, by granting a long lease of the farm. It would be depreciated in value at least 10 or 20 per cent. Notices, in his opinion, required to be two or three years long to enable a tenant to get out of the land all he had put in. Still, even then, a tenant would not get out all. There was one thing particularly which he could not get back—good drainage. Their present payment for drainage was nothing like what it should be. At the same time, gentlemen should bear in mind that whenever they paid for what they could not see, if the outgoing tenant was a rogue, they stood a specially good chance of being robbed. They might have sagacious valuers, but there were equally sagacious tenants, and the result was that they would be robbed, so he should warn them to be careful. Another point in which he cordially agreed with Mr Manfield was, that the tenant should be allowed to sell what he pleased off the farm. Their landlords greatly over-estimated the amount of damage a tenant could do a farm by selling his produce off it. If all tenants had power to sell hay, straw, and roots, there would not be much more sold than there was now, but the price would be lowered, for it was only the artificial production that kept the price up at present. If everybody had liberty to sell straw, there would be little more sold, and London cow-keepers, who were the principal purchasers of roots, would not buy many more than they did now, only the benefits would be more equally distributed. But they must be careful how they followed their friends of East Lothian, for all these liberties would be followed by an advance in rent. If they compared their rents with those paid in Scotland they were most startling. He was very much surprised at them, and he could not see how a very handsome balance could be left for the tenant. Their landlords would be sure to say, "If I am going into these liberal covenants, I must have an equally liberal rent." They must remember, however, that it was tenant farmers who set the rents. Still, as there were sure to be six good applicants for every farm, the landlord was pretty well independent, and if they would not accept his terms some one else would, so that they could not go further than suggestive measures. At the same time, when they hired a farm, he hoped they would always do so with the idea that the landlord would look after his interests, and that they must look after theirs. Something had been said ab-

an understanding when they hired land. Let the understanding be in the lease. That was what he wanted to see. Let all understandings be upon paper, and then don't let them say that a landlord or a tenant was acting unfairly when they acted up to a lease and would not go beyond it. He did not think any man should be above asking for his agreement to be put on paper, for however liberal a landlord might be, a time must come one day when he would go to heaven or somewhere else. Then as to game. It was quite right what Mr Hitchcock had said, that a man had a right to do as he liked with his own; but still he thought if a limited liability clause were introduced into their leases, it might have a wholesome effect. If he was in the happy position of being a landlord, as he was only, he was sorry to say, to a very limited extent, he should not object to a limited liability clause; but still he would have game, and he would have sport, and if the tenant thought he was not going to have either he would not suit him. But he should not object to a clause, that if the damage by game exceeded a certain amount the value should be paid to the tenant, and in reference to this he was fully aware of the difficulty there was in valuing damage by game. With regard to the allowance for unexhausted oilcake, &c., he did not go so far as Mr Manfield. He should not go beyond the last year, and he should give a proportion, and only a very small proportion, of the value of the oilcake and manure consumed. His experience was to allow as little as possible for things which they could not investigate and look into. With regard to repairs, in his opinion, it was best for tenants to have an interest in them, and then they would be more careful in asking the landlords to do so much. It was expedient for both parties that they should each bear a proportion of the expense. He had in his own experience met with very hard cases, where the tenant was ready to find his portion of the works while the landlord would not find materials. Tenants in hiring should look out for this. He knew a case where a farm was sold a year before the lease expired, and the new owner came upon the tenant for dilapidation, while at the same time the tenant had been trying to induce the old landlord for years to find materials, and he had not been able. He thought that difficulty might be met by the landlord having to pay a penalty for not doing his share. Another point raised was the landlords having the preference over other creditors; but he thought there was more to be said in favour of this than was often urged, for they must remember that if the landlord was not so protected, directly a tenant got into difficulties, he would be ejected. The landlord would not let him remain if there was the least hazard of losing his rent, and thus very often a tenant would have no opportunity to retrieve his position, and he would very likely be unable to obtain another farm, if it was known that he was ejected from the one he previously held for non-payment of rent. For these reasons he should not be prepared, in the interests

of tenants generally, to ask for the abolition of the law giving the landlord a prior claim. This power, too, was much over-estimated. It was thought that the landlord had a prior claim for all rent, but he really had a prior claim for only one year's rent. He had known instances, also, where men had retrieved their position from landlords allowing them to remain in the farm. He must disagree with Mr Hitchcock when he said this was not a proper time to introduce the question. He thought the subject was *apropos*, and that Mr Manfield did well in selecting it, and if the discussion was somewhat more meagre than usual, it arose from the fact that the greater portion of their members were not aware of the subject to be discussed.

Mr GAYFORD said, in these days when there was a great deal of talk about education, of making everybody cleverer than everybody else—(laughter)—as it seemed to him, of giving universal suffrage and vote by ballot, it was necessary, and it was their bounden duty as tenant farmers, if they had grievances, to express them, and seek for redress in every fair and legitimate way. If there was anything that was conducive to their interests, let them combine and get it carried. But they must be careful to avoid noisy clamour, or in any way identifying themselves with Messrs Beales, Potter, and Co., who having nothing themselves, only wanted to upset everybody, that in the universal scrimmage they might be able to pick up something for themselves. He hoped they would take higher grounds than that. It had been well said that property had its duties as well as its rights, but it had also its rights as well as its duties. They knew that their landlords in times of distress and trouble came forward and gave them the benefit of their assistance, doing their duty in the position in which Providence had placed them, and it was their duty, as tenants, to accord to them all the rights and privileges pertaining to their position. He was much pleased with Mr Manfield's remark, that the lease he had drawn out was one he would either hire or let upon. That was the way to approach a question fairly and impartially, and then they were in a fair way of getting their grievances redressed. Then there was the question of game. It was the fashion now to talk about doing away with it entirely. It was the greatest mistake out, for a man surely had a right to do as he liked with his own. He for one should be very sorry to see the Game-laws done away with. They wanted to get the country gentlemen among them, and they could not do that unless they had sport to give them. If they had not some of the right sort of the old aristocracy among them, they would be in a pretty fix. As to selling property with a lease upon it, might there not be a clause giving the landlord power to take the farm into his own hands upon paying a valuation or a certain fixed sum? A lease, however, was a decided benefit to both landlord and tenant.

Mr VINCE said, he was glad that some one was

sticking up for the poor tenant farmers. A tenant, who had a good lease, however, had very little to complain of. As to game, they did not mind their landlords preserving a little, if they would only come and live among them.

Mr MANFIELD said, he did not agree with Mr Hitchcock as to the law of hypothec. He should be sorry to see the landlord's security lessened, but he wanted to see the tenant's security increased. He did not wish to say anything disparaging to landlords, nor did he wish for legislative interference, but he wanted to shew that it would be for the benefit of both parties to do as he advised. The rents would increase, while at the same time the profits of the tenant would increase also. As to game, he thought there must be legislative interference, for in some places game was not preserved as it should be; there was an excess of it, and it did damage. Of course there were parties—both landlord and tenant—who would take advantage where they had the opportunity, but he purposely omitted from his remarks all reference to them. Mr Biddell said, owners did not cultivate their land better

than tenants. Let them look round their neighbourhood, and see if they knew anywhere a better cultivated district. Yet many of the farmers owned their land, and those who did not had good landlords, and were not restricted. Mr Biddell said it was a bad plan to pay for what they could not see, but in drainage, of which he was speaking, they could see what had been done by drawing a furrow. He should recommend that some one should be appointed to see that drainage was done fairly and well. As to oilcake, he was quite of opinion that only a small proportion of the amount expended for that during the time mentioned should be allowed. He wanted a kind of free trade in farming. Let the tenant grow whatever would pay him best, except in the last year or two of his occupancy. It was certainly against the landlord's interest to restrict a tenant when it did not injure himself. A tenant should be allowed to grow and sell what he liked.

A vote of thanks to Mr Manfield for his paper, moved by Mr Burrell and seconded by Mr Baker, was unanimously accorded.

AGRICULTURAL EXPERIMENTS AT CIRENCESTER.

THE Cirencester Chamber of Agriculture have issued circulars to a number of gentlemen engaged in farming pursuits, the object being to test the action of certain specified manures on the growth of various crops. As it is absolutely necessary to secure uniformity in all reports, Professor Church, who fills the chair of Chemistry at the Royal Agricultural College at Cirencester, has drawn up the directions to be followed by the various experimenters. We give a copy of the directions, which may be found useful by other societies who purpose instituting experiments of a similar kind :—

DIRECTIONS FOR CARRYING OUT AGRICULTURAL EXPERIMENTS.

1. The greatest accuracy must be observed in measuring the plots; each plot must be defined by stakes at the corners, and be of a square form.
2. A plan of the experiments should be kept, and the treatment to which each plot has been subjected written upon the square representing it.
3. Duplicate plots are essential, and the duplicates

should not be placed next each other, but as far apart as possible: see the accompanying diagram :—

A	E	D	H
B	F	C	G
C	G	B	F
D	H	A	E

4. Two untouched and unmanured plots should be provided for comparison.
5. The manures may be distributed by hand, very carefully, going twice over the ground. Equal distribution will be secured by mixing the manure with three or four times its bulk of dried and sifted earth before applying it.
6. In any subsequent cultivation, such as rolling, hoeing, &c., care must be taken that all the plots are treated alike.

7. In harvesting cereal experiments, use the hook or sickle, and tie into neat sheaves.

8. Much trouble is saved by threshing at once in the field, or from the field without previously stacking.

9. If stacking is desirable, separate the lots with layers of straw, making the experimental produce into a little rick by itself.

10. Before threshing, provide labels for the produce of each plot. As each plot is threshed, tie the descriptive label in with the band, and *chalk* the number of the plot on the bag in addition.

11. The straw must be collected, tied up, and weighed; the experiment is rendered more complete if cavings and chaff are each weighed separately.

12. Samples of the grain of each plot should be preserved in bottles or sample bags.

13. Samples of corn in the straw should be collected at harvest, labelled, and preserved.

14. The number of bushels will be best calculated from the ascertained weight of the grain.

15. In harvesting root crops, count the roots on each plot as they are weighed.

16. A strict account should be kept of the treatment and appearance of the plots throughout the season.

Weighed quantities of manures are forwarded from the Royal College of Agriculture to gentlemen who will undertake the experiments suggested by the sub-committee.

NEW EXCISE LICENSES.

THE following questions were put by a correspondent of the *Banffshire Journal*, to the Chancellor of the Exchequer, in generalities. He sent them to the Inland Revenue Commissioners to answer. They requested that the questions in general be made special cases. This was done, and the cases were put in the following shape. The replies of the Commissioners are placed below the queries:—

I. "Male servants," I., F. M., keep one pony, have no servant, and am my own groom and stable boy; but, in case of sickness, have to employ a man or boy to perform the duties of said offices. Query.—Am I liable for license duty?

Answer. The Board will not require you to take out a license for a man or boy occasionally employed by you to attend to your horse under the circumstances stated, unless the man or boy be *regularly employed* by you in some other capacity.

II. Particulars and circumstances as in question 1st. But that I may have to leave home on duty or pleasure, leaving my pony to be attended to by a man or boy, for a day, or perhaps a week at a time, casually. Qy. Am I liable in said case to pay license.

Ans. The cause of the *casual employment* of the person engaged to attend to your horse is not material, and the answer to your first query will therefore apply here.

III. M. X. is a farmer, who has a pony and gig, the pony used partially at farm work. M. X. occasionally grooms his pony, and yokes or unyokes the same. The pony is fed by a man servant, who is engaged in general work on the farm; the pony is partly groomed by the said servant—mostly so. Said man servant partially yokes or unyokes the said pony. Qy.—Is M. X. liable to pay for a man servant or par-

Ans. M. X. should take out a license as for a groom in respect of the farm labourer who attends, as stated to M. X.'s *taxable* pony and gig.

IV. Y. Z., another farmer, all the particulars as in question 3d, but has only a pony which is licensed—no gig. Is he liable for license?

Ans. If the pony in question be used for riding, Y. Z. should take out a license for the farm labourer who grooms such pony.

V. This question was detailing the work of a jobbing gardener who never served an apprenticeship, giving names, &c. The questions were—Had each party to license the same man? or did one license serve for perhaps a dozen employers? If so, how was it to be paid, or who was to pay said license?

Ans. A license is *not* required for any person who is employed only as a *jobbing gardener*.

VI. As in question 5th, only the jobbing gardener was a man who had served an apprenticeship. Questions as in 5th.

Ans. The foregoing answer applies equally to the case here put by you.

VII. "Male servants, carriages, horses: hired by me, but for whom the duties have been paid by the party letting the same." (This is the heading of a part of the declaration form as supplied to parties to be filled up when making declarations), see page 3d of Declaration Forms as issued by Inland Revenue. I, F. M., employ some, perhaps 20 or 30, more or less, different parties or carters to perform paid cartages on roads, &c. Do I, the employer, have to fill up a declaration form, as stated in said page of said forms, for every case of said hire?

VIII. Do I, the employer, have to fill up said declaration form when the owner of said horse is driving said horse?

IX. Do I, the employer, have to make out said

returns when my workmen have charge of said horses, the owner or owner's servant not being engaged with them?

Ans. It is not necessary for you to make any return of horses and carts hired from carters to do work upon the roads, &c., nor of the servants employed to drive the horses used for such work.

X. Do I have to make said returns when I hire for

my own use a horse, or horse and gig, the same not being in charge of owner or owner's servant?

XI. Particulars as in question X., but that the said horse or gig was in charge of owner or owner's servant?

Ans. If the hirings, here referred to by you, are for a day, or other short period, no return is required to be made by you.

GAME-LAWS AMENDMENT (SCOTLAND) BILL.

THE following is the text of a Bill to amend the Game-laws in Scotland, prepared and brought into the House of Commons by Mr Loch, Sir Robert Anstruther, and Mr Parker :—

Whereas the Acts specified in the schedule to this Act annexed, and hereinafter referred to as the Game-laws, have been passed for the preservation of game in Scotland :

And whereas in various parts of Scotland serious evils have arisen from an excessive increase in the numbers of hares and rabbits, which has been encouraged or permitted to take place in the midst of cultivated districts; and it is expedient that the Game-laws be amended with a view to the removal of these evils :

Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same :

1. *Short Title.*—This Act may be cited for all purposes as "The Game-laws Amendment (Scotland) Act, 1870."

2. *Interpretation.*—In this Act the following words shall have the meaning hereby assigned to them respectively :—

"Tenant" shall mean any person in the occupation of any lands under any lease or agreement of lease, written or verbal :

"Lessor" shall mean any person being the owner or entitled to receive the rents of any lands occupied by a tenant :

"Sheriff" shall mean the sheriff of the county of which he is sheriff, and shall include sheriff-substitute.

3. *Tenant may Kill Hares and Rabbits.*—From and after the passing of this Act, it shall be lawful for any tenant, by himself, or any person employed by him, and having his authority or permission, to kill and take hares and rabbits on the lands occupied by him, subject to the provisions hereinafter contained, and to have in his custody or possession hares and rabbits so killed or taken.

4. *Tenant not to be divested of Right to Kill Hares*

and Rabbits.—It shall not be lawful for any lessor and tenant, after the passing of this Act, by any lease or agreement between them, verbal or written, or otherwise, to divest or deprive such tenant of the power to kill and take hares and rabbits by this Act conferred on him, or to restrict him in the exercise of that power; and any lease or agreement entered into or made in contravention of this section shall be void and of no force or effect.

5. *Notice by Tenant to Lessor where Right to Kill Hares or Rabbits is Reserved in Lease.*—Any tenant holding under a lease existing at the passing of this Act, in which the right to kill hares or rabbits is reserved to his lessor, may give notice in writing to his lessor that he intends, under the provisions of this Act, to kill and take hares and rabbits, or either of them, upon the lands occupied by him, and upon such notice being given, and upon payment by such tenant to his lessor, during the term or currency of such lease, of such annual stipulated abatement or allowance from the rent, if any, as may have been expressed in such lease in consideration of the reservation therein by the lessor of the right to kill hares or rabbits, or where no stipulated abatement or allowance from the rent is provided by such lease upon payment by such tenant to his lessor during the term or currency of such lease, of such compensation, if any, as may be agreed on or may be fixed by a valuator, to be named by the Sheriff on the application of the lessor or the tenant, it shall be lawful for such tenant to kill and take hares and rabbits as provided by this Act.

6. *Compensation for Damage caused by undue Number of Hares and Rabbits.*—Any owner or occupier of any lands may present a summary petition to the Sheriff, complaining of damage sustained by him from hares or rabbits on any lands adjoining to, or in the vicinity of, the lands belonging to or occupied by him, and the Sheriff shall thereupon appoint a copy of such petition to be served on the owner and occupier of the lands in regard to which such complaint is made, and shall within six days after the presentation of such petition, appoint a competent person to inquire into such petition, and to report whether there is an undue number of hares or rabbits on such last-mentioned lands, and

to value the damage, if any, caused thereby; and the Sheriff, on receiving such report and valuation, shall, after hearing parties thereon by themselves or their agents *viva voce*, if they appear before him, or if after due notice they fail to appear before him, consider and dispose of such petition and report, and may find that the petitioner is entitled to such sum as the Sheriff thinks fit as compensation for damage sustained by him, and shall order such sum to be paid by the owner or the occupier of such last-mentioned lands, or by them jointly, or in such proportions as the Sheriff may determine.

7. *Cost of Proceedings.*—The expenses incurred in or with respect to any petition presented to the Sheriff under the provisions of this Act, and the proceedings thereon, shall be in the discretion of the Sheriff; and he may find either of the parties to such proceedings liable to the other in such expenses, or may modify the same as he thinks fit.

8. *Judgments of the Sheriff to be Final.*—Any judgment pronounced by the Sheriff-Substitute in a petition or proceeding under the provisions of this Act may be appealed to and reviewed by the Sheriff, and all interlocutors or judgments pronounced by the Sheriff-Substitute and not appealed to the Sheriff, and all interlocutors or judgments pronounced by the Sheriff, in petitions or proceedings under the provisions of this Act, shall be final and not subject to appeal or review in any Court, or by any process whatsoever.

9. *Prosecutions under Game-laws to be before Sheriff.*—From and after the passing of this Act, all offences against the Game-laws now cognisable by Justices of the Peace shall, notwithstanding anything in those laws contained, be inquired into and determined by the Sheriff of the county where the offence shall be committed, at the instance of the Procurator-Fiscal for the county, and the powers and jurisdiction of Justices of the Peace and Quarter-Sessions under those laws shall cease and determine; and all powers, authority, and jurisdiction given by any of those laws to Justices of the Peace shall henceforth be vested in and exercised by the Sheriff, and any forms or procedure applicable to prosecutions or proceedings before Justices of the Peace shall, *mutatis mutandis*, be applicable to prosecutions and proceedings before the Sheriff; and it shall be competent for the prosecutor or for the defender or party accused who shall have been brought before the Sheriff-Substitute in the first instance, to appeal to the Sheriff from the decision

of the Sheriff-Substitute in all cases in which it is provided by any of the Acts specified in the schedule to this Act annexed that it shall be competent to appeal from the decision of Justices of the Peace to the Quarter-Sessions, and subject to the same regulations as are provided in the said Acts, or any of them. Provided that it shall be lawful for the Sheriff, in pronouncing sentence for any offence under any of the Game-laws, to modify any pecuniary penalty, or any term of imprisonment specified in such Game-laws, in such manner and to such extent as he may think fit.

10. *Persons Convicted not to be Prosecuted again for the same Offence.*—Any person who has been or shall be convicted of any act as being an offence under any of the Game-laws, shall not be liable to be again prosecuted for the same act as being an offence under any other of the Game-laws.

11. *Tenants not liable to Assessed Taxes or Licenses.*—Any tenant, or any person employed by him, and having his authority or permission, who may kill or take hares or rabbits under the provisions of this Act, shall not thereby become liable to pay any assessed taxes or excise-duties, or be bound to take out any license or game-certificate.

12. *Saving existing Leases of Shootings.*—The provisions of this Act shall not apply to or affect any lands included in leases existing at the passing of this Act, of game or shootings, to persons not being the occupiers of such lands, during the term or currency of such leases: Provided always, that the tenant of any lands included in such leases of game or shootings may present a summary petition to the Sheriff, complaining of damage sustained by him from hares or rabbits on such lands, and the same proceedings shall take place on such petition as are hereinbefore provided with respect to the petition of an owner or occupier of lands, and the Sheriff may find that the petitioner is entitled to such sum as the Sheriff thinks fit as compensation for damage sustained by him. Provided also, that the lessee of such game or shootings shall, with reference to any petition which may be presented under the provisions of this Act, for recovering compensation for damage caused by hares or rabbits, and the proceedings thereon, be regarded as the occupier of lands, in regard to which any complaint may be made, and be liable accordingly.

13. *Act to Apply to Scotland only.*—This Act shall apply to Scotland only.

[The schedule contains a list of thirteen Acts relating to game.]

PHYSICKING PIGS.

THERE seems to be a universal impression that no aid can be rendered to a sick pig, except by throwing into its trough which contains food something in the shape of a drug. It will at once strike the weakest-minded person that if an animal is ill, and has lost its appetite, it will eat nothing, and yet recourse is had to medicine, by way of temptation, I suppose. It would be difficult to find a drug to tempt the appetite of a sick pig. If the breeder of pigs depends upon this kind of assistance, we wonder no longer at the large annual mortality which is known to take place in animals of this class. I have no doubt that, if as much attention was paid to the diseases and treatment of the pig as is paid to those higher in the scale, a vast deal of money would find its way into the pockets of pig breeders.

Ignorance is the cause of much loss in Ireland, not only in reference to this class of our domesticated animals, but it will apply to most other classes. The only effectual remedy is to invite those to reside among them who are capable and willing to spread abroad knowledge. The reason the people on the other side of the Channel are wiser in this branch of education is the fact that, in every hamlet, and village, and town, will be found men who have devoted their entire lives to the diseases of the lower animals. I am not confining these remarks to the qualified man; what I mean to state is, that these men are reared from their infancy, and study nothing but brute medicine, which renders them capable of doing much good in the absence of a better educated practitioner. Unfortunately for this country, in many localities there has not, up to the present moment, been sufficient temptation to start as a practitioner, simply for the one reason, viz., in Ireland, if an animal is sick, and its owner sends for assistance, he invariably thinks one visit, or two at the most, should be sufficient. This, then, causes what some persons imagine a large fee to

be expected, and I have no hesitation in declaring this is the result of the system. There are men with sufficient capital who can wait for four years to work up a practice. Owing to the adopted, it necessitates the practitioner to make a charge for his attendance as in some instances be considered exorbitant. If the owners would club together, and make some fair offer to go among them, much good may be done. The proper mode to proceed is to call in the aid of a surgeon, and give the case up to him to visit as he considers necessary. Knowing, as I do, how difficult it is to treat animals from hearsay, and anxious to impress upon the minds of persons in the country that symptoms may change every hour, requiring a change in the treatment, and symptoms are not likely to be observed by the medical attendant. Many years ago I addressed observations similar to these, in which was added the payment of attendance in the following way: 3s. 6d. per visit within one mile of one's residence, and an additional shilling per mile afterwards. This has acted well in other parts of the world, and I do not see why it should not work well here also. Nothing appears certain, that the various agents in charge of property may lend a helping hand in carrying up such a scheme.

With regard to the mode adopted for giving medicine to pigs, place a small rope around the upper jaw, and raise the nose of the animal slightly upwards out of the level only, by passing the rope over the top of the wall, or bank: the assistant should have the bottle either in a tin, bottle, or drenching horn, which may be used for the purpose, the dose being gently poured into the mouth and swallowed. If the medicine should be taken between the legs of an assistant, the head elevated, as it is usually done, ten chances to one suffocation will take place.—R. H. DYER.

Papers by Tim Bunker.

NO. XXXVI.—TIM BUNKER ON SAVING A
SIXPENCE

HOW HE BEAT JAKE FRINK.

MR EDITOR,—I hadn't calculated to write at all this month, until I got your letter. I never was much of a hand for indoor work, and could always use a crowbar enough sight better than a goose quill. I must say I like to make marks upon the soil a great deal better than upon paper. When you have turned over an acre of land a-day, with a deep tiller, it kind o' looks as if you had done something. I have a natural affection for such furrows; but these scratches upon paper are rather small potatoes, and few in the hill. If it wa'n't that I had got interested in the farmers who read your paper, and could sort of feel their hands in mine, I would never touch a pen again.

Your letter found me down on that bit of swamp pasture that I bought of Jake Frink, and underdrained last year—where I cured the horse-pond. I was just putting down a new bridge across the ditch, that I had left open on the back side of the lot. There was an old bridge a dozen rods above, going into another field, that Jake had built when he owned it, several years ago. Neighbour Frink, you will remember, beat me on carrots at the show, in a way that was not fair. I have always felt bound to keep up a decent kind of resentment ever since.

slabs, as if a large brook was always running through. It must have cost him a considerable sum of money, reckoning labour at any thing like a fair price.

And here is a point I think of a good deal of importance to farmers. There are not more than half of them that do a thing in the best and cheapest way. They don't save a sixpence where they might just as well as not.

What is the use of walling off land into 2-acre fields, when 10 and 20-acre fields are a good deal more convenient? Why, some men up here have kept themselves cramped for money all their days, by building stone fences where they were not wanted. What is the use of taking 4 acres to grow 100 bushels of corn, when you can grow it cheaper upon one? What is the use of paying £5 for a bridge across a ditch, when you can have one just as good and durable for £2.

It was curious to hear my neighbours speculate, when I got the things together to make the bridge.

"Going to set up a crockery shop, Squire Bunker?" said Uncle Jotham, as he struck the tiles with his staff.

"What new tricks you got in your head neow?" asked Seth Twiggs, as he thought of the tiles and the brain manure in the garden.

"Going to dig a grave, and brick it up?" asked Jake Frink, as he looked over the fence.

"Nothing of the kind, Mr Frink—you made a grave for £10 or £12 in your ridge up yonder, and I think there has been grave-digging enough of that kind in this bit of land."

had got a dozen horse-shoe tiles of 7-inch
size, costing, all told, just one crown; and a
white oak plank 2 inches thick, 12 feet long,
and about 1 foot wide, sound as a nut—cost,
another crown. I laid the plank upon the mud
in the bottom of the ditch, about 3 inches
under the water. I then put the tiles upon

the plank, covering them with a lot of old straw, and then packed in the turf, grass side down, over them, and filled up with gravel from a neighbouring hill. There was about a half-day's work carting dirt, and the whole was finished. That oak plank, I think, will last a good deal longer than I shall; and I shouldn't wonder if my grandchildren found it as sound as it is to-day. The tile will last as long as brick in a chimney. The whole cost of the bridge is not over three crowns, and it is quite as durable, and a good deal more ornamental, than that rough stone affair that cost fifty. The fact is, I am getting sick of the sight of stone above ground, except in lime walls, since I have begun to drain, and to use a horse-mower. I can't help thinking how much better they would pay in a good stoneculvert under the land, or even in raising up the land in swampy places. On the surface they are unsightly, they take up a good deal of room, and are always in the way of the plough and the mower. Beneath the land, they are out of the way, and are saving the sixpences in carrying off the excess of water. There is nothing on the farm so handsome as a clean green meadow, just ready for the scythe.

I think I have beat Jake Frink on the bridge, and that will do to set over against the carrots.—Yours to command,

TIMOTHY BUNKER, ESQ.

NO. XXXVII.—TIM BUNKER ON GIVING LAND A START.

MR EDITOR,—“What are ye gwine to du with that 'ere bag of Scotch snuff?” asked Jake Frink one morning, as he looked at a lot of Peruvian guano just landed at my barn door.

“Who has a better right to have a tea-party than Mrs Bunker, and to entertain the old ladies with a pinch of snuff?” I asked by way of rejoinder, and to stimulate Jake's curiosity, which was already wide awake.

“I thought snuff allers come in tins,” suggested Seth Twiggs, as he blew out a column of smoke that would have done credit to a locomotive.

“That's guanner, ye fools!” remarked Uncle Jotham Sparrowgrass, with a very emphatic blow of his cane upon the ground. “Have'nt ye never seen any guanner? I've seen it twenty years ago. Never could make much out of it. Got one or tu decent crops, and then the land fell off, worse than ever. It's a great humbug.”

“Ye aint a gwine to put that on tu the land, be ye, Squire Bunker?” inquired Jake with an astonished look.

“I shouldn't wonder if I did.”

This conversation with my neighbours, now many years ago, shews the general impression about guano in any community, when it is first introduced. I had got it to try an experiment on some poor land, that lay off a couple of miles from my house. I suppose a man ought to apologize for owning land so far from home, for it is certainly very bad husbandry. The expense of cultivating it is nearly double that of a home lot, and manuring with stable dung at that distance is out of the question. The fact is, the land belongs to Mrs Bunker, and, as it came from her father, she never felt like selling it. It has been used for pasture ever since I can remember. For the last ten years I have not been very particular about pasturing it, for there was not much grass there to be eaten. It was miserable old plain land, and had once been a light sandy loam, before the loam was carried off in crops. The sheep had worn little paths around among the brush, and if sheep have any virtue to restore exhausted land, that field never found it out. I suppose all the vegetable matter that grew upon an acre, if it could have been gathered, would not have weighed 200 lb. It used to be said of it, that it was too poor to bear worms and insects, so that they had to starve or emigrate.

We have a great deal of such land hereabouts, thoroughly worn out, and not paying 5s. an acre to their present owners. They are generally farmers in moderate circumstances, and have no spare capital to give such land a start, and it lies idle and worthless. I thought it was worth trying to give this out-lot a chance to do a little better by itself and its owner. My plan was to turn in

green crops—a process in husbandry that nobody practises in this neighbourhood. I had read of it, and thought it was just the thing for lots too far off from the barn to be manured from the stable. The trouble was to get the green crop to turn under.

I thought the guano would probably start rye, and with this I could make a beginning. I ploughed up 5 acres two years ago in October, and put on five bags of guano, or about 150 lb. to the acre. The rye came up well, and looked a remarkably dark green; and by the time snow fell, the ground was well covered with a thick mat of rye. That rye made a good deal of talk, and even on Sunday it used to be discussed between services, when folks ought to have been thinking on other matters. It passed the winter well, got a good start in the spring, and by the middle of May, the heads began to appear. It stood thick, and was thought to be one of the best looking pieces of rye in town. It went against the grain amazingly to turn it under, for according to the look, I should have had 15 bushels to the acre.

About the middle of June, John and I went into it, with two teams, to plough it under; for I had made my plan, and was not to be turned aside by the talk of my neighbours. Tucker and Jones said it was a great shame to spoil such a field of grain, and even Mr Spooner remarked, that making manure of bread-stuff did not seem to be very good economy. Now, you see, I did not care so much what Horatio Nelson Tucker and Arthur Wellington Jones said, but I did not like to be undervalued by the minister. So said I to Mr Spooner—"A thing always looks

homely until it's finished; and you just wait till I get through with this field, before you make up your mind."

The rye was ploughed under, and the ground turned up about 2 inches deeper than ever before. In about a fortnight I sowed tares, harrowing it in with about the same quantity of guano that I had used in the rye. The tares came up and grew more rankly than anything I ever saw before. All the neighbours were astonished at the monstrous growth, and most astonished when I brought out the teams, the last of August, to turn it under. They said, Tim Bunker must be crazy to make manure of the heaviest crop of tares in the county. But the tares went under, notwithstanding. The last of September, I sowed with rye again, and as I had put two green crops under the sod, I thought the land had got start enough to take care of itself. I sowed with the rye, clover, and Timothy grass seed, calculating that these would take the ground when the rye came off. Last July I harvested from that 5-acre field, 125 bushels of rye.

Now, I think we have here a hint as to the economical way of giving land a start. If it lies near the barn, where manure can be carted cheaply, the stable manure is the best renovator. If it lies at a distance, it can be done with Peruvian guano and green crops; and it is much better to do it with this than to have it lie idle. Mrs Bunker is as much pleased with the result as anybody, for she says "it has always distressed her to have anything belonging to the Bunker family lying idle."—Yours to command,

TIMOTHY BUNKER, ESQ.

Our Library Table.

Stove and Greenhouse Flowering Plants. By S. WILLIAMS. Vol. I., 8vo, pp. 329. B. S. Williams, Upper Holloway, London.

construction of this book is essentially that followed by the same author in reference to his works on *Orchids*, which we reviewed at page 349 of the present volume, to which it forms a suitable companion. This volume, which is complete in itself, is devoted exclusively to a selection of plants remarkable for the beauty of their flowers; and we have the author's promise, that it will be followed by a volume of similar size and character, devoted to the extensive and important class denominated Ornamental Foliaged Plants. Good books, like that now under notice, on both these subjects, are, we know, wanted; and therefore, when both shall have been placed before the public, the author will have performed a service, for which in return he may expect a grateful recompense.

The first division of the volume before us is devoted to Stove Plants, *i.e.*, plants which, in our climate, require a considerable degree of artificial heat—plants, the most of whose names are in the Tropics. Then come Greenhouse Plants, and lastly, Florist Flowers, and what are termed soft-wooded plants, recommended for conservatory and greenhouse decorations. These heads are arranged in the classes which they belong—the very aristocrats of the world, the principle of “get out farthing, and place to the florin,” being, in our opinion, a principle too rigidly carried out; for, we must confess, we miss in the ranks some things which we would have been glad to have found there. Be that as it may, we feel sure that all must accord a hearty welcome to the treasures therein set forth, and must exclaim “well and long” for the coming volume.

Before advertent to the lists of genera and species, which considerably the greater portion of the work is a matter of course, devoted, let us briefly direct attention to one or two short chapters on miscellaneous remarks which precede that department.

Beginning over the observations as to how the antient Greeks and Romans managed, or rather mismanaged, plants, information for which Mr Williams is less indebted to his “own correspondent,” we come to remarks on plant stoves, in which it is stated that for the growth of specimen plants, a span-roofed stove is undoubtedly the best, as it affords increased facilities as regards the admission of light and air, and, at the same time, such a structure may be made into an ornament in a garden, in which no other

style of house could be tolerated. A representation of a house of this description, such as Mr Williams recommends, is given. It is 50 feet long, 20 feet wide, 12 feet high, and contains a table next the outer wall, on each side and end, a walk 3 feet wide, and a centre table, which has a second table 1 foot higher, running down its middle. These tables, our author recommends to be of slate, with iron supports, while the floor and path are best concreted with good Portland cement, mixed with sand, which makes a substantial and comfortable floor and pathway. The side-lights or sashes should be 2 feet in height, and need not be made to open; but instead thereof, some large iron or slate ventilators should be built in the brickwork beneath them, opposite the hot water pipes. Large drain pipes are also recommended to be laid in the ground, passing from the outside under the foundation to the inside of the house, and running under the heating pipes, by which means fresh sweet air may be admitted even during severe weather without injury to the plants. A lantern roof for stove ventilation is considered the best. For plants that require bottom heat, a brick tan-pit must be substituted for the centre stage, or another house must be devoted to their growth. Whether hot-water is employed for bottom or surface heating, there should be, in Mr Williams' opinion (in which, too, we entirely acquiesce) plenty of pipes; for great waste of fuel, and much injury to the plants, result from being compelled to drive the boiler to its utmost, through want of piping. Therefore, four rows of piping, instead of three, should be employed in a stove of the size just indicated. For jointing the pipes, Mr Williams employs india-rubber rings, which are made specially for the sizes in which the pipes are cast. By the use of these, if anything goes wrong, the joints can be easily separated and re-adjusted. 21-oz. sheet-glass, in panes about 2½ feet in length and 9 inches in width, is that which is found most serviceable.

A good shading material is said to be yet a desideratum. The best at present known for roof-shading is canvass, but Mr Williams uses tiffany for the sides. The strips into which it is divided should have rings sewed to them on both edges, to fasten on hooks, fixed in the house at corresponding distances. This is necessary, in order to prevent wind blowing the blind on one side, and thus exposing any part of the interior to the sun's rays in an unguarded moment.

As regards cisterns, they should be made of slate or brickwork, from the floor level to the bottom of the centre table; or in cases in which they are sunk

the floor, a pipe from the boiler should be made to pass through them, for water thus stored is found to be colder than the temperature of the house in which the cistern is placed, which is undesirable.

Chapters are devoted to soils, potting, and watering. Then we come to insects, the most formidable of which are greenfly, mealy bug, turtle or brown scale, thrips, and red spider; against which Mr Williams asserts that there is no better safeguard than keeping up a vigorous state of health among the plants and maintaining strict cleanliness. One of the best remedies for greenfly and thrips is fumigating with tobacco or tobacco paper. Mealy bug and scale require washing off with a small brush and warm soft soap and water; while for red spider, when it has been allowed to spread, flour of sulphur should be sprinkled upon the hot water-pipes and the house shut up close. This remedy must, however, be used with great care, for if the pipes should be too warm the foliage will be sure to suffer. Of this we have seen melancholy examples in some graperies. It is better to keep a careful watch upon the plants, and to destroy the spider the moment it makes its appearance. Red spider dislikes water, and where that can be applied safely it seldom gains much of a footing.

Trellises are now made of galvanized wire, which does not rust, and they are in every way preferable to wood. For hexacentris, lapageria, and plants of that kind, the umbrella form is most suitable; while for plipladenias, allamandas, and Stephanotis, Mr Williams prefers the balloon shape to any other. Pillars in groves should be covered with climbers, which may be tied on wires, in the way of festoons, from one to another. Mr Williams rightly objects to flat-backed or one-sided plants, and adds that "nothing can be in worse taste, or be a greater eyesore, than a house filled with such deformities." Greenhouse azaleas were at one time nearly all trained to a "face," and, when in flower, without a green leaf to be seen, they looked like "great red aprons bulging towards the beholder." These, we are happy to say, are fast disappearing, and forms more natural and pleasing in outline now occupy their places.

Passing over short chapters on resting, drying-off, and propagation, we arrive at one on hybridizing and cross-breeding operations, which seek to effect the improvement of the flower as to size, or form, or colour, or all these conjointly; or it may be the improvement of the foliage, or the production of a better habit and constitution of the particular plants operated on. "In setting about the raising of either hybrids or varieties," says Mr Williams, "the operator should set before him a definite and settled purpose, for if promiscuous seedlings are reared a great loss of time will ensue, seeing that good results from such crossings cannot be expected. . . . We have always found that in crossing plants the seedlings are prone to follow the colour of the male parent, and the habit and style of growth of the female. Therefore, if the result desired be richer and brighter colours, the paler

of the two parents should be made the seed-producer. We had a striking example a few years ago, in the case of some gloxinias, of the influence of the pollen; it was at a time when the varieties of gloxinia were few, and when *G. Fyfiiana* was the only erect-flowered kind. We fertilized *G. rubra grandiflora* with pollen taken from *G. leuconerva*, the latter then a new variety, our object being to obtain varieties with white-veined leaves and red flowers. And as *G. leuconerva* was not so robust in habit as *G. rubra grandiflora*, we made the latter the seed-bearer, but in the result, out of several hundreds, we had but one or two which produced red flowers; the habit was robust, and much stronger than that of the male parent, and the white veins less conspicuous on the leaves; but the flowers were of a much richer colour, being a deep purple, and larger, partaking in the latter character of the mother plant. Thus the experiment, though it produced some very handsome varieties, was in direct opposition to our wishes; but it afforded a lesson by which we profited in after-attempts at cross-breeding."

The following remarks upon fertilization deserve to be widely circulated:—

"In seed saving, independent of hybridizing or cross-breeding, astonishing results may be obtained by a little selection and care." These remarks apply most forcibly to choice "strains" of flowers which are grown for early spring, autumn, and winter decorations, and which are to a great extent deprived of insect agency for the fertilization of their flowers, and are consequently dependent upon artificial impregnation. In performing this operation, the pollen of one flower should be used to fertilize its neighbour, as this ensures a greater produce of seeds, and a more vigorous constitution in the plants resulting from the operation. Being a delicate and tedious process, it does, of course, occupy some time; but the greater quantity of seed thus obtained amply repays the extra trouble. That this is so, we have had some striking proofs in the course of some experiments which we have made in reference to this question. For example, we found that the stigma of one flower fertilized with pollen from a separate flower, but growing upon the same plant, yielded four times as much as when left to fertilize itself, and above one-half more than when artificially impregnated with its own pollen. Carrying the experiment still further, and bringing pollen from another plant of the same species, but which had not originally sprang from the same stock, we found that the produce was three times the quantity yielded, under the most favourable circumstances, of the other experiments, viz., the fertilization by pollen from a separate flower of the same plant. The contrast, was, however, greatest with the flower which received no aid whatever; for with the foreign pollen applied artificially, the yield of seed was finer in quality, and twelve times as much in quantity, while in the respective cases of fertilization with foreign pollen (that is pollen from a different plant), and with its own pollen,

the yield was five times greater in favour of the foreign pollen. This will be seen more clearly by the following table :—

EXPERIMENT 1.—Produce of a flower not receiving artificial aid in any way.—25 seeds.—Yield of seeds one-twelfth that of experiment 4.

EXPERIMENT 2.—Produce of a flower fertilized with its own pollen.—60 seeds.—Yield of seeds one-fifth that of experiment 4.

EXPERIMENT 3.—Produce of a flower fertilized with pollen from a separate flower grown upon the same plant.—100 seeds.—Yield of seeds one-third that of experiment 4.

EXPERIMENT 4.—Produce of a flower fertilized with pollen from a different plant of the same species.—300 seeds.—Yield of seeds highest both in quantity and quality.

This experiment was repeated several times, insects of all kinds being most carefully excluded from the flowers, and though differing in some cases in the number of seeds, yet in each the proportions were about the same. Now, although we are not prepared to assert that the like results can be obtained in the case of every species or variety, yet, from other experiments which we have made, we are certain that the yield of seed will be larger and finer when the flowers thus receive the benefit of a cross with pollen from a separate plant, and where insect agency is deficient it should always be applied by artificial means. To avoid self-fertilization the flower should have the stamens removed as soon as possible after it is open; this may be done by cutting them out with a small pair of scissors. According to some authorities, certain flowers fertilize themselves before expanding, but this is no doubt very exceptional.

In the case of shy seed producing plants the value of these experiments will be apparent.

The book, which is printed in a good clear type, and which is altogether one which we can heartily recommend, is furnished with a copious index, and has, as a frontispiece, a faithfully drawn and prettily coloured plate of *Anthurium Scherzerianum*, by Fitch.

The number of species and varieties described in it, is stated to amount to upwards of 1000, to which are appended instructions as to their cultivation and mode of management. To young cultivators, it will, therefore, prove a boon.

—
Haydon's Dictionary of Biography. Edited by J. B. Payne. London: Moxon, Son, & Co., 1870.

So far as one can examine a book of such fulness, we cannot do other than say that this Biographical Dictionary is decidedly one of the most complete and accurate that we have ever seen. There is scarcely a name of note, from our first parent downwards, that we do not learn something of in these pages. And speaking of "the grand old gardener" by the way, who "brought death into the world and all our woes," it is

pleasant to find in this volume, immediately after his name, another of the same, a composer of music. Harmony succeeding discord! that is as it should be. There are two or three names, however, omitted that we should like to have seen. We have Mr M'Laren, a geologist, who was editor of the *Scotsman*; but we do not find Mr M'Culloch, whose name as a geographer, as author of the "Commercial Dictionary," and late head of the Stationery Office in London, is more widely known than that of Mr M'Laren. He was also an editor of the *Scotsman*. The name of the present editor, Mr Russel, whose influence is great in the north, is also absent. Still we regard this book as one reflecting the highest credit upon the editor, Mr J. Bertrand Payne, alike for his laborious researches, and good judgment and taste in the way that he has presented these to the public. And scarcely less do we admire the printing, which throughout is good, the genealogical tables specially so.

—
Saddle and Sirloin. London: Tuxford & Sons.

THE author of this book is ever happy in his titles, choosing always for them

"Apt alliteration's artful aid,"

And by this means, we believe, nay, we have it on the best authority, he once secured a subscriber to one of his works, a sporting one, which was named "Silk and Scarlet." The buyer was a very Protestant old lady, who thought that scarlet had some reference to the Pope. We have heard the author chuckle over how much the old dame must have been disappointed when she came to cut up the pages. Good enough they were in their way, but not quite the walk in which she would wish to travel. We can scarcely say, to take his own alliterative style, that in this choice of title, "Saddle and Sirloin," he has

"Boldly, by battery, besieged Belgrade."

He has rather taken it by stratagem, as on former occasions. The book is far from being all about "Saddle and Sirloin;" in fact—if not quite the reverse—it is so discursive, and, therefore, all the more entertaining, that it ranges over almost everything interesting in rural life. But we must confess to be a little surprised at so agreeable and generally so accurate a writer falling into mistakes with regard to facts. For instance, he tells us in a very genial notice of Mr Hall Maxwell, late Secretary of the Highland and Agricultural Society of Scotland, that he distinguished himself at the International Show at Battersea "in '61." We have a vivid notion that Battersea Show was held, not in '61, but in '62, and that Mr Hall Maxwell instead of being "in his element," as the "Druid" expresses it, was perfectly out of it, for the reason that he had there little management in the show-yard. How could the "Druid" forget that the Royal was held at Leeds in 1861? There are one or two other slight inaccuracies in the book; but, on the whole, it is extremely e-

able reading. We wish that we could say that the printing was equal to the merits of the author.

[We regret to add that since the above notice was written, the amiable author, Mr H. H. Dixon, better known as the "Druid," has been taken from us. He died on 16th March last, at the comparatively early age of forty-seven.]

Nature; An Illustrated Journal of Science. London : M'Millan & Co.

"NATURE

Cares not although her beauties ne'er be seen
By human eyes, nor praised by human tongues,
The cataract exults among the hills,
And wears its crown of rainbows all alone ;
Libel the ocean on its tawny sands,
Write verses in its praise, the unmoved sea
Erases both alike. Alas for man,
Unless his fellows can behold his deeds,
He cares not to be great."

Our contemporary *Nature*, and as an agricultural journal, we are justified in noting this, does not appear to be like that great mother whom we all own. It is not oblivious to its own merits. It is rather like "Man," of whom the late author of the "Life Drama" spoke, as in the quotation given above. And by the way we have a notion that this is one of the best passages in Alexander Smith's work, although but scantily recognized at the time by the critics who gave prominence to the passage, commencing with the line

"The bridegroom sea
Is toying with the shore, his wedded bride."

Nature desires to make an exhibition of itself. Not content with the innate knowledge that it is sublime, it generously airs what it has got for the benefit of the public. For instance, in a late number, there is an article upon "Science and the Public Health," which commences thus : "Among the wide range of subjects included in the programme of *Nature*, one of the most important to mankind in general is certainly 'the public health.'" Now, fancy a writer, writing about science, and who therefore might be expected to be accurate in his phraseology, describing Nature as having a wide range of subjects in its programme. We had the notion that nature instead of having "a wide range of subjects," had a universal one ; in fact, that by it we live, and move, and have our being ;" and, also, "that health was no more important to "mankind in general" than to man in particular. After these statements, our contemporary goes on to tell us about many

aqueducts. The whole article is watery enough, certainly, but it is doubtful whether it is accurate, and whether the author had examined all the sources of encyclopaedic things in reference to health, and to information before he wrote. For example, we are told that "the total length of the Marcian was actually 54 miles," and that the "Anio Vetus, the Claudian, and the Anio Novus, were from 42 to 49 miles in length." We had actually thought that the Aqua Marcia was nearly 60, and that the Anio Novus was not less than 62. But *Nature* knows better, being superior to Art. There are, however, some very readable and sensible papers in *Nature*.

The Villa Gardener. London : Simpkin, Marshall, & Co. ; Edinburgh : J. Menzies ; Dublin : W. H. Smith & Sons.

WE have received an early copy of this aspirant to fame, in connexion with a kind of gardening which is much desiderated now by those who own villas. And who does not own villas it may be asked ? and the reply would be, nearly everybody who is engaged in a city trade. "Work while it is called to-day, but the night cometh when no man can work." All day they are in the city, and at night, or at an hour at which most men call night, or a time of rest—say after banking or after post hours, as the case may be—having wrought hard from the opening to the shutting of the establishment, they are quite entitled to have a little relaxation. And where, after they have dined, on a spring or summer, or even autumn evening, could they better enjoy it, than in their own Villa Garden ? In the first season they have the exercise of sowing the seed ; in the second, the pleasure of seeing it in bloom ; and in the latter, blooming and melancholy, as a rule, fading. And even in "gloomy winter," if they see not some blossom or fruit (we leave out the mistleto and the holly), there is the satisfaction of knowing that a following spring will revive, if not the ashes in the "urn," at least some of the seeds that lie dormant in the receptacle. "The Villa Gardener" promises to tell us how all this can be enjoyed to the best advantage. Practically how we can manage a small garden for ourselves if we care to work ; how, if we are not practical workers, we can know whether those employed under us are so, or otherwise ; and practically the Magazine gives us a foretaste of its inward qualities by the beautiful appearance of its outside. If the first number is an indication of what succeeding ones will be, we doubt not that this young applicant for public favour will meet with success.

The Garden.

MESSRS F. & A. DICKSON & SONS' NURSERY, CHESTER.

A NURSERY business, when it is well done, is one of the most charming occupations of life. We are all fond of plant cultivation of some kind. This we seem to inherit from mother nature; and when we cannot enjoy a country house or cottage, with grounds, or a patch of soil for growing shrubs and flowers, we delight in a few pots on the window-sill, or in buying a bunch of choice or common evergreens, or plants "all a-blowing." Lord Bacon was wont to say, "A garden is a great civilizer of mankind." We believe this axiom might be greatly enlarged upon in its practical application. At any rate, a man, be he peer or peasant, who takes a pride in his garden, and in shewing it to his friends, is seldom anything but a good master of a household, a good friend, and a good neighbour.

These reflections occurred to us a few days since when we were taking a chance stroll through the princely Nurseries—as they may be fairly termed—of Messrs Francis and Arthur Dickson & Sons, at Upton, near Chester. This is one of the most delightful places for studying the character and habits of ornamental trees and shrubs, fruit trees, smaller ornamental plants, and greenhouse and open-air flowering plants, that we have ever visited. Whilst there seems to be everything which a gentleman or a cottier might want, everything is arranged in the most systematic order, and there are carriage drives and walks, as fine and smooth as the roadways and footways of a domain kept up for pleasure only. But as this is a place of business for enabling gentlemen to improve and preserve the beauty of their pleasure grounds and parks—or for furnishing rich "merchant princes" and "manufacturing

lords," who may not be able to find eligible parks and grounds ready made—the shrubs, and evergreens, and fruit, park and plantation trees, are all young; and instead of being in clumps, lines, belts, or circles, they are in well-defined plots of one or two or more acres of particular varieties.

The grounds under exclusively cultivation for these Nursery purposes extend to about 150 acres. When it is considered how much there is to be done in grafting scions on stocks, in laying branches, training to stakes, berry and seed sowing, transplanting, and so on, over this extent of ground, the amount of skilled labour required will be seen to be very great; and when the digging, hoeing, weeding, and packing up of produce are also taken into account, the additional labour required will be readily set down at a large figure. The number of skilled and unskilled labourers, in the form of gardeners, husbandmen, youths, and boys, varies from 100 to 150, and the average wages paid per week amounts to nearly £100. All this, too, is apart from the large weekly expenses in the offices and warehouses, at 106 Eastgate Street, Chester; Eastgate Buildings, and Cuppin Street.

Of Forest Trees there are growing at the Upton Nurseries acres of English Oaks, Ash, Beech, Elm, Birch, Lime, Poplar, Spanish and Horse Chestnuts, Turkey Oak, and so on, all of which vary in age according to the purpose for which they are intended. Thorns, or quicks, for hedges, are also grown in large breadths, both as seedlings and in transplanted plots. Of Firs, which are grown for sheltering hills and lands in cold districts, or where there are blowing sands, there are Scotch and Spruce Firs, and Austrian and Corsican Pines

the demand for the latter having greatly increased of late years. The Larch Firs are an extraordinary sight; these are of the Scotch and Tyrolese varieties. One plot, which was sown from selected cones last spring—contains upwards of *five millions* of plants. These are about four to six inches high, and with their fine foliage, now varying in colour, from the autumn weather, and being perfectly free from weeds of any kind—cut too as the beds are into alleys for the facility of cultivating without damaging the plants—they present, at one and the same time, a pretty appearance and the perfection of cultivation. These small plants will all be sold this year for estate purposes. A fact of this kind is gratifying in more respects than one, for the craze there has been of late years for grubbing out everything in the shape of hedgerow or timber, has not only spoiled the picturesque beauties of many parts of this country, but openings have, in our opinion, been created for an immense amount of damage to be done in this variable climate of ours, to agricultural crops—to say nothing of stock, which often require out-of-door shelter both from the summer's sun and the winter's blast.

Turning from what we may term the more practical departments, or acres and plots, we have the beautiful tribe of ornamental Coniferæ, introduced of late years, now grown into magnificent ornamental trees around the family house of the founder of the firm. As this establishment is approached, there are on each side of the carriage drive, lengths of Deodars, the most graceful of all lawn trees; Wellingtonia, the most gigantic of its order; Cupressus Lawsoniana, an ornamental conifer, not to be surpassed for its fine foliage and pyramidal growth, &c.

We now come to the convenient offices and extensive packing sheds. In front of these are the variable ranges of glass houses and cold pits for growing and propagating greenhouse, hothouse, and out-of-door-plants. In the cold greenhouses there are large collections of Cacti, among them are elegant forms of Epiphyllums, grown as standards, as we may term them, that is, grafted on stocks

of Cactus Pereskia. These were standing a foot or so high, and the long leaves were hanging around their pots covered with the delicate and showy blossoms for which these plants are celebrated. In another house there were Alocacias—plants with magnificent foliage, which are now so justly fashionable, or in favour with amateurs and connoisseurs. The Camellia house is full of every kind of the most healthy plants, with their buds swelling ready for bursting into bloom to deck the dress and coat of belle and beau at dinners, balls, or other festivities. At the end of this house there is a specimen of rock-work done by some genius in artificial rock caves, for he has imitated nature so closely that the blocks, cemented over and tinted with the colour of nature's deposits, make the whole look of one piece, as though it was the result of volcanic eruption, or one of the inexplicable freaks of nature upon which geologists descant, but fail to satisfactorily explain. In another greenhouse there is the beautiful plant Tacsonia Van Volxemii, trailing here and there, bearing fruit and blossom at the same time. This is a remarkable and beautiful plant which will grow in any ordinary greenhouse. It is allied in its appearance and nature to the Passion flower. The propagating houses are plain enough in their character; but when we say that the geometrical flower garden in front of these greenhouses, which is planted for the attraction and admiration of visitors, requires 20,000 plants annually to furnish its various beds, some idea may be formed of the extent to which these elementary or preparatory departments run. There is, of course, a propagating house for tropical plants; and when we refer to the ingenious contrivances in the form of miniature houses, or frames within houses, which are required to preserve the exact and uniform temperature wherein these tropical plants will strike root by artificial means, some correct notion will also be formed of the elaborate character of this department. In this house there were some splendid plants of the scarlet Anthurium Scherzerianum, the value of which is 2 to 5 guineas each.

Vines, too, are a leading feature of this

establishment, as the demand for these plants by the inhabitants of the suburbs of our large towns, to the villas of which are generally attached small or large greenhouses and vineries, is something extraordinary. Thousands of the best kinds, having their canes well ripened off, are in convenient form for despatching safely, at an hour's notice, to the end of the country, if required, or, for that matter, to China, or any other end of the world.

Ferns, again, which are so generally admired, and are always so pleasing, have a large space devoted to their propagation and development. Scores of hardy and delicate varieties, in thousands of pots, have been recently struck, and they are all regularly labelled, so that, whatever the student of Mr Moore's "*Book of Ferns*" may fancy, he will certainly not be disappointed in having his wishes gratified.

Leaving the green-houses and hot-houses, a complication of fences, which we may term a gigantic maze, is before us. Of these fences there are six miles! As a rule, they are in squares of various sizes, their height being from six to nine feet, and the thickness about one foot. They are composed of thorn, hornbeam, holly, privet, &c., and it is almost needless to say they are kept in admirable order. These fences are for the protection from the wind, &c., of the more delicate plants and shrubs, which they enclose while they are being raised. This is an example, in our opinion, from which many landlords, land agents, and farmers, who have been carried away by fence-levelling enthusiasts, may learn a lesson which, if practised, would be profitable to the pocket as well as agreeable to the eye. We believe if such fences as these divided the chalk hills and the open blowing lands of Norfolk and Suffolk, the fens of Cambridgeshire and Lincolnshire, the Wolds of Yorkshire, and similar exposed places, into 20-acre squares or less, that, in nine seasons out of ten, the crops grown on them would be largely increased. A straw will protect a yard of ground from being blown bare of snow, and a fence eight or nine feet high afford a corre-

sponding amount of shelter from the blasts of winter and the gusty tempestuous storms of summer.

In the first fenced-in square immediately in front of the glass houses is the geometrical garden above mentioned, in which are planted, in the spring and summer, all kinds of bedding plants. Beyond and adjoining this garden is a rosary, in which is planted every kind of rose which is of any value, whether it be the old cabbage rose, or the latest beauty of the season. What a delightful lounge this must be on a summer morning or evening, when the best of these roses are in full bloom!

In the other fenced-in squares are all kinds of delicate fruit trees, as peach, nectarine, plum, fig, and so on, some trained on stakes, and some on six-inch boards nailed to posts. Pear, apple, cherry, and other fruit trees, are also growing in their proper place, in every form in which they can be trained to suit purchasers, whether they want them for high walls, low walls, house ends, or fruit houses.

In one of these plots is a fine lot of *Araucaria imbricata*, or monkey-puzzle—so called because the sharp and thickly set spines render it impossible for this venturesome and agile animal to ascend its trunk or branches. An *Araucaria imbricata* growing here is allowed to be one of the most magnificent specimens of this variety in the whole country. Its height is over 30 feet, and the graceful way in which its drooping branches bend to the ground, at the same time retaining their natural green colour, and its symmetrical towering top rising high above the branches, make it altogether, for size and beauty, superior to any we ever saw.

Where there is such an abundance of everything which is choice and fashionable, it is almost superfluous to refer further to the varieties of plants which are the ordinary stock of a nursery. Running at right angles with the approach road, and from the ends of the glass-houses, is a long straight drive through the centre of a piece of land, from two or three to some hundreds of yards wide, on which are growing young plants of Portugal and common laurels, *Laurestinus*, *rhodo-*

dendrons, hollies of many kinds, and other well-known ornamental plants, which every lover of a shrubbery admires for their hardy character and chaste appearance in their light and dark green foliage. These plants, too, we found growing here, not in trifling strips and patches, but by the acre or acres.

Returning to Chester we made a call at 106 Eastgate Street, where we found the large floors of Messrs Dicksons' newly-built Seed Warehouse filled with garden seeds, bulbs, and other articles necessary to supply the wants of the horticulturist, floriculturist, &c., while in their warehouses the agricultural interest receives special attention. These extensive premises are stored with immense stocks of turnip, Swede, and mangold seeds; specially amongst these are the Dicksons' De-fiance, and Dicksons' Scarlet Rind Swedes,

for which this firm is so noted; Dicksons' Long Red and Yellow Globe Mangolds, &c. These seeds are the produce of very carefully selected stocks, their culture being conducted either under their own personal supervision, or of those long experienced in this most important department of the business.

White and yellow turnip seeds are also grown with similar care, and large supplies of each kind are now in stock. Besides these there are large supplies of seeds of all kinds of herbage and forage plants, and clover seeds of every description.

A more enjoyable and instructive day we have seldom spent, than that on which we visited the Upton Nurseries; and if any reader should by chance drop down at Chester, we would advise him to take advantage of Messrs Dicksons' courtesy and follow our example.

MR RICHARD SMITH'S NURSERY, WORCESTER.

AMONG what are termed provincial nurseries, this is one of the most important, both as regards extent and stock. Its principal entrance is from the Bransford Road, where, on entering, a straight avenue of nearly 1200 yards in length at once arrests attention. This is planted on either side with conifers, varying in height from 1 foot to 8 feet, the border being backed up and set off to good advantage by a substantial yew hedge. To the left of the entrance are Mr Smith's offices and foreman's dwelling-house; the latter a commodious building, surrounded by a well-kept lawn, dotted about with many fine specimens of ornamental trees, chiefly conifers—a class of plants for which this nursery is famous. On careful inspection, it was found that an *Araucaria imbricata* growing here, measured some 25 feet in height. *Pinus Lambertiana*, one of the largest of Californian Pines, was more than 20 feet in height, and 12 feet through; Chinese Juniper, of equal height, close and

compact—in short, forming quite a column, its width at the base being scarcely more than 3 feet. *Juniperus excelsa*, of similar height, was also very handsome. The same remark equally applies to *Juniperus thurifera*, nearly 20 feet, to an *Abies Douglasii*, 30 feet, and to a noble *Cedrus argentea*, 15 feet high. Of *Abies Menziesii*, we noticed a specimen upwards of 30 feet in height, and of the beauty of *Pinus nobilis*, and *Nordmanniana*, it is impossible to speak in too high terms. The soil of this locality, a light fertile loam, apparently furnishing all that such trees require for their perfect development. Among other conifers planted as specimens, we observed thriving examples of *Abies Morinda*, 18 feet in height, a handsome *Wellingtonia*, about 15 feet high, a *Thuja aurea* and *Japonica*, the latter more upright in growth than the former, which was at least, 7 feet in height. Among weeping conifers was an example of *Juniperus viridis pendula*, 13 feet high, a capital tree for

teries, being deep green in colour, and pendulous as a weeping willow.

One specimen of *Abies nobilis* special attention ought to be directed; it is about 20 feet in height, and the stem 58 inches at the ground level; it has borne cones undiminished. This tree is unusually glaucous in aspect, and, though grafted, has done very well with plants raised from seed. *Prunella* is a neat close growing kind, of *Pinus macrocarpa* we noticed an example nearly 30 feet in height. *Thuja plicata*, some 14 or 15 feet in height, was green in colour, and altogether so charming in general appearance, that it would not be lightly termed a tree Lycopodium. Near the sides of the walks were planted golden *Yew*, dwarf *Arbutus*, and pigmy firs, the oldest of which, though many years old, is not more than 18 inches.

Among other kinds of trees were *Quercus pedunculata*, a magnificent specimen of weeping *Yew*, concealing many square yards of turf beneath the sweep of its drooping branches; *Colchic Laurel*, a seldom seen but very good sort; ornamental hollies of different kinds; the laurel-leaved oak, and a variety of the close-headed prettily drooping *Prunella japonica*.

The chief among pendulous trees is, however, a weeping ash, with sturdy trunk, and a head of drooping branches.

We were much pleased also with the appearance of beds on the lawn, which, during the winter, had been filled with flowers. They were now tastefully stocked with either silver *Yew* (in pots) or golden *Yew*, Irish *Yew*, *Prunella*, *Retinospora*, Irish gorse, *Yew*, *Laurustinus*, or some kind of shrub that looks well in a mass, and contributes satisfactorily with the neighbouring trees, giving the lawns a pleasing effect during the dead months of winter. These little beds are planted in autumn, and are ready in May, when the bedding plants are put out.

A border, backed by a *Yew* hedge, by which the ornamental department is encircled, cut off from the propagating ground, are striped *Yews*, *Thujopsis borealis*, Irish

Yews, *deodars*, *Thuja Wareana*, *araucarias*, and standard *rhododendrons*, planted in alternate rows, and graduated from 2 to 8 feet high.

On a tastefully formed rockwork, behind which is hidden a range of propagating houses, are planted ferns, Irish gorse, *Berberis Darwinii*, tree and other ivies, with alpine and other plants—all so skilfully worked up as to furnish a charming illustration of wild nature by no means unattractive, even in the midst of highly dressed grounds. On the right of the entrance is a house 117 feet in length, and 17½ feet in width, appropriated to the growth of vines for fruiting in pots; and adjoining it are two orchard-houses, each 25 feet in width, one 45 feet in length, and the other 115 feet in length. These are filled with young fruit trees in pots, consisting of peaches, nectarines, apricots, figs, oranges, apples, pears, plums, and cherries, all of which in their season produce capital crops of large and finely flavoured fruit. On a tree obtained from this collection, a *Duchesse d'Angouleme* pear was produced weighing 25½ ounces, and measuring no less than 14 inches in circumference. It was also as good in flavour as it was large in size. Orchard-houses, indeed, possess in Mr Smith a redoubtable champion,—so thoroughly convinced is he of their utility as to be ready to defend them whenever required to do so. In addition to these just named, in another part of the ground, he has one no less than 196 feet in length and 27½ feet wide, full of excellent young trees in pots, capable of bearing heavy crops next season, being thoroughly ripened in the wood, and full of fruit buds. This forms a portion of his trade, on which immense pains and labour are bestowed. Nor do the trees alone receive attention; the construction of the houses has also been well considered. They have fixed roofs, and are not only light and roomy, but well ventilated. The last is effected by means of small lights in the roof, which lift up and let down as may be required; and at the sides lateral ventilation is secured by horizontal sliding boards, 50 feet in length, having holes cut in them to correspond with

apertures of similar size in the wall. Cheapness as well as efficiency has also been aimed at, and persons contemplating the erection of such houses would do well, before commencing, to inspect Mr Smith's arrangements. In other glass houses, which are numerous, are grown stove, greenhouse, and other tender ornamental plants.

It is hardy stock, however, to which we more particularly wish to direct attention. For the propagation of this, most ample means are provided, not only in the shape of uncovered brick-edged beds, occupying nearly three acres of ground, but also in the form in ranges of glass-covered pits, a thousand of number, in which are raised all the more valuable and choice conifers, and other evergreens, which must number some millions. These, when large enough, are transferred to open quarters, from which, again, the finest specimens are selected to decorate the sides of a drive which runs through the centre of the grounds, and which is more than a mile and a-quarter in length. Both sides of this are ornamented chiefly with conifers of the most beautifully formed and thriving description, the whole varying from 2 to 7 feet in height, disposed in rows of different colours, in the style of our modern ribbon-gardening. To furnish descriptions of these plants would occupy too much space, but persons desirous of obtaining them will find them given in Mr Smith's carefully arranged and very excellent catalogue. We may add, that great attention is paid to make every plant a specimen of its kind, a remark which does not apply to fine things alone, but also to such as yews, laurels, and spruce firs. Stiffness and formality of outline are, however, carefully avoided. They are also all transplanted every two years or so, and therefore never well to other places when wanted.

Many of the grown larger plants are being employed in the cultivation of the fine autumn white, which we have been favoured, some good blooms were gathered even up to Christmas. On all the varieties has been made clean, strong and healthy wood, the soil being

apparently equally suitable for them with that of Hertfordshire.

Young fruit trees may be obtained here in any quantity, 150,000 to 200,000 stocks being annually used in their propagation, and to this branch of Mr Smith's business, unusual attention is paid, in order that every thing may be true to name. The better to ensure this, a specimen tree of each kind is kept, and the operations of cutting off buds and grafts confided to the care of one man, who likewise examines the stock three times a-year, viz., at the period of its coming into leaf, when the foliage is fully grown, and at its fall, with the view of ascertaining if all is correct. Under such active supervision, therefore, errors in nomenclature can hardly take place. Each tree is also a perfect specimen of its kind; summer pinching being constantly exercised, and the soil being well tilled, their health and vigour, even during dry seasons, are truly astonishing. Young shoots of cherries were found to be, on actual measurement, 5 feet in length, those of pears 6 feet, plums 8 feet, and apples 4 feet. Small trees, therefore, soon reach a fruit-bearing stature, and, as regards form, they may be had in the shape of dwarfs, pyramids, half standards, and standards, in short, any shape required, both trained and untrained,—some 40 acres being devoted to their culture. With respect to varieties, Mr Smith's fruit tree list will be found to furnish ample information.

About 30 acres are set apart for the culture of conifers and other ornamental trees and shrubs, besides that used for what may be termed miscellaneous stock. Among the latter we noticed a fine variety of weeping spruce, and many fine examples of the variegated *Acer negunda*. Of standard and pyramid Portugal laurels, intended to be used as a substitute for orange trees, we observed multitudes of handsome examples, as well as of what is called *Quercus austriaca hybrida*, a very hardy and useful looking oak. We were also delighted with the beautifully glaucous colour of *Abies nobilis*, the stock of which is most extensive; quarters of Nord-

manniana are also abundant; of these and Wellingtonias, Deodars, Araucarias, Thyopsis, Cupressus Lawsoniana, Thuja aurea, Chinese and other Junipers, Abies Douglasii, orientalis, and others, we likewise observed an immense stock arranged according to sorts, and graduated to facilitate selection. It will therefore be seen, that among first-class establishments this holds no inferior position. Order, neatness, skilful management, and good cultivation, are its distinguishing characteristics, and owing to the pure air and fertile soil of this fine country

blight and its attendant evils are almost unknown.

We regret to have to record that, some short time ago, a gang of depredators entered Mr Smith's ground, and destroyed many fine conifers. What motive there could be for the commission of such mischief, it is difficult to conjecture, as Mr Smith is not only a liberal but a kind employer, and greatly respected in the neighbourhood. A large reward was offered for information as to the guilty parties, but we have not heard that they have yet been brought to justice.

A GARDENER'S VISIT TO VIRGINIA.

HAVING made up my mind to pay a visit to Norfolk, in "old Virginia," professionally, I started from London with that object in view early in May last.

I reached Liverpool by rail, and there embarked in the "Australasia." To get to New Jersey, I found that a first-class passenger, to be comfortable, ought to have £25, and a third-class one £10; and if the parties belonging to the latter class are without money or friends at the end of their journey, the case is a hard one, as without a few dollars or "stamps" in their pockets, people are at present of little use in America. Whether, however, one goes north, west, or south, a week is not ill spent in New York, in order to acquire some acquaintance with men and manners in the new country, as in that city the inhabitants are said to "out-bustle all creation;" and indeed Englishmen will find it harder to live there than in London, or even in other cities in America. As there are numerous prosperous towns and villages lying on the journey from New Jersey to Norfolk, if work for garden labourers is to be found anywhere, they will be most likely to met with it in the direction just named, and at higher wages than they would probably get in other districts. This portion of country is rapidly recovering

from the effects of the war; and its towns, which every day are becoming more and more important, offer great facilities as regards communication with Baltimore, Norfolk, Richmond, Washington, &c.

On the morning of Friday, the 25th of May 1869, I left the Courtland Street Station, New Jersey, for Norfolk. The first town met with on the journey is Newark, about which the lands, though rich and good, are flat, marshy, and fen-like—resembling in these respects those between Huntington and Grantham at home; but the Trent at Newark, in Nottinghamshire, is not so fine as the river on the banks of which Newark in America is placed. Elizabethtown, which was next reached, is remarkable for its coal and iron trade. It is surrounded by fine orchards, good grass-lands, and not far from it are fine tracts of natural forests, and rivers that vary from 5 to 9 miles in breadth. We now arrive at New Brunswick, which is 31 miles from New Jersey. Here we find a canal 41 miles in length, cut from Ryton to the Delaware. After crossing this the landscape becomes pretty, and for at least 20 miles in all directions park-like. Fields are well enclosed by means of good post and rail fences; and, indeed, in general aspect the country hereabouts reminds one of Berkshire,

especially that part of it lying in the neighbourhood of Reading. Villa residences stud the suburbs of New Brunswick, which can boast of some fine buildings, as well as various schools and colleges.

We now come to Trenton, the capital of New Jersey, whose spired churches bear considerable resemblance to buildings of the same kind in old England. Planted along its streets are rows of *Acer Wageriana*, which here forms a fine large tree, well suited for town decoration, while the river puts one in mind of the Thames between Hammersmith and Putney Bridge. Its banks, too, are well wooded, and ornamented with many pretty villas, the residences of well-to-do citizens. The river divides the State of New Jersey from that of Pennsylvania. Bristol, which is about 3 or 4 miles farther on than Trenton, is worthy of special notice on account of its market gardens, which resemble those about Isleworth, and seed-growing farms. Turnip and cabbage seeds appear to be saved here in large quantities, their quality being equal to that of the same kinds of seed grown in Bedfordshire. A little farther on, the number of Virginian cedars by the road-sides remind one of the landscape around Bourgomo, in Italy, about which plantations of cypress form a conspicuous feature. These and other evidences of high-class civilization tell us that we are approaching some city of importance, and we are soon informed that that city is Philadelphia, the neighbourhood of which, like that of all first-class cities, is full of interest. Here may be found lands in the best of tilth, villas in all styles of architecture, gardens replete with modern improvements, more especially as regards glass houses, parks laid out after the most approved fashion, and kept in a manner equal to that exemplified in similar places of recreation in the neighbourhood of London, Liverpool, and other large English towns. Philadelphia, or what is termed the "Quaker City," is $2\frac{1}{2}$ hours' ride by rail from New York, from which it is distant some 95 miles. I inspected it with much care, along with one of its best informed citizens, Mr Mehan, of Germanstown, and the impression made on my mind is that it is

one of the very first towns in America as far as civilized grandeur is concerned. Viewed from one of the bridges which cross the Delaware, both it and the scenery about it are most beautiful.

Proceeding in our course, we come to Washington, and between that city and Perry Ville good farm and grass land, as well as some fine peach orchards, occur. At Perry Ville, a fine river about a mile in width is crossed, whose well-wooded banks look not unlike those on some parts of Lake Windermere, but with surrounding scenery more richly wooded, and in general appearance more artificial. Lydle water, with its islands, as seen from this point of view, reminds one of Loch Katrine, or, perhaps, Helen's Isle, so graphically described by Scott in his "Lady of the Lake." Vegetation here is about ten days in advance of that in England at the same season. About Aberdeen, which is situated in this district, are some fine corn lands, as well as some noble trees. Here the railway crosses a beautiful lake, half-a-mile in width and about 5 in length, on the banks of which are some large wild cherry trees, oaks, acers, and other trees.

Finally, we have the town of Magnolia, and lake, or rather arm of the sea, about a mile long and 4 wide, with bold scenery and noble trees, the whole as natural as can be by planting. Here there is much land uncleared; still there are many orchards of peaches and gardens for supplying the markets of Baltimore.

A journey by rail from New Jersey to Baltimore costs 6 dollars 5 cents. At Baltimore I took the boat to Norfolk, which is 22 hours' sail and ride by rail from New Jersey. I landed at Portsmouth, whose fine bay is the admiration of all who see it. This Norfolk port is deep enough to receive the Great Eastern, and in Hampton Roads, outside the harbour, there is room for all the shipping of the United States. In the neighbourhood of Norfolk, plenty of land is for sale at from 50 dollars to 100 dollars per acre, including houses and other buildings (the dollar being worth 3s. or 3s. 2d.) The soil is a sandy

loam, and its chief use the raising of early vegetables and fruit for the New York market. Society is excellent and delightful in Norfolk, and the peasantry and trades people compare favourably with our own in England.

At six o'clock A.M. on the 29th of May I paid a visit to some of the markets in Norfolk, which, as a rule, are well stocked with all descriptions of produce. The prices of some of which may be worth quoting by way of comparison with ours at home.

This district is quite a fortnight earlier than that of New York; strawberries are ripe here by the beginning of May, and cherries by the middle of the same month. We had strawberries and cream for breakfast, at which there were tea and coffee, different kinds of meat, poultry, oysters, ice, and apples. I could get 2 quarts of strawberries for 25 cents, which was also the price of cherries. Good asparagus realized 60 cents per 100; York cabbages, which are grown here all the year round, 10 cents per 100; peas, 60 cents per peck; turnips, consisting of three bunches of 4 each, 10 cents; beef about the same price.

Though unconnected with horticulture, I may mention that pork fetches 20 cents per lb.; beef, from 20 cents to 1s. per lb.; lamb, 1s. to 1s. 2d. per lb.; mutton, 20 cents per lb.; fowls, 1s. 6d. each; good asparagus chickens, three months old, from 50 to 60 cents per brace. The fish market contains more sort of fish than I can name, the bay being rich in that commodity. A 10 lb. salmon is worth a dollar, oysters are cheap, and indeed, in Norfolk, food of all kinds is very plentiful and good.

By way of information to market gardeners who may think of emigrating to Virginia, I may mention that plenty of negro labour is obtainable about Norfolk for 10 dollars per month, with an allowance of a peck and a-half of meal and 3 lb. of bacon per week. Skilled market garden hands, however, get from 15 to 20 dollars per month. In the strawberry grounds around Norfolk, I have seen as many as 500 negroes gathering strawberries on a 30-acre plot of newly broken up land. The average produce of an acre of

this crop is worth about 180 dollars. Garden produce last year around Norfolk was calculated to realize about 20,000,000 dollars. It can be sent to New York three times a-week. At 2 cents per quart, which negroes on "piece-work" get for gathering strawberries, they can earn from 1½ to 2 dollars per day. I was, however, told by Mr Lindsay, a market gardener, near Norfolk, that in some seasons he could get any amount he required of black labour, in return for merely board and lodging. Norfolk has, within these last three years, nearly doubled its population, and, therefore, lands for "garden farms" are much in request. One agent alone, I was informed, had recently sold as many as 50,000 acres for that purpose. A prominent feature of this kind of culture is the strawberry grounds, to which cultivators pay great attention. The variety chiefly grown is called Wilson's Albion, a large showy marketable kind, but somewhat coarse. Of this sort, Mr Lindsay has 5½ acres, from which he gathered this year 24,000 quarts of fruit. When he first prepared this ground for strawberries, he applied to it 100 bushels of guano, and 300 bushels of bone-dust. The plants cost 3½ dollars per 1000, and the 5½ acre piece took 10,000 plants, while, for putting them in the ground, 150 dollars were paid. About Norfolk, negro labour is said to be 50 per cent. cheaper than white labour.

About a mile and a-half from Norfolk, Mr Lindsay has a vineyard consisting of about 60 acres.

The kind of grape grown about Norfolk is the Concord, which has a round black berry; the vines, which are managed on the bush plan, after the fashion of those on the Continent, are planted for the most part 8 feet apart, but some plant 5 by 8 feet apart. Plants from cuttings cost about 50 cents per 100. The Concord, which is a seedling from the native vine of Massachusetts, is a hardy and abundant bearer; the bunches, which average about a-half pound each, are ripe about the 1st of August. Their market value is from 20 to 25 cents per lb. A fair crop for well established vines is about 1600 lb. per acre, the price being about 6d. per lb. Be-

fore sending the fruit to market, it is carefully packed in small boxes, 40 of which are again enclosed in a case of sufficient size to hold them. One bushel of grapes makes about a gallon of wine, of a kind resembling an inferior sort of port.

In orchards, besides vines, there are figs, peaches, apples, pears, and other fruits, grown in connexion with asparagus. Of the latter crop, I observed one plot 10 acres in extent. Tomatos are also largely cultivated here for market. The young plants for this crop are raised under glass, and are planted out in the open ground in the beginning of May, all frost to hurt them being considered then to be over. Under this treatment the fruit is ripe about the middle of June.

Peach orchards do not come into bearing until three years after planting. The kinds employed are the Early York, Early Margaret, and Hales' Early. During the first year of a new orchard, corn or peas is planted under the trees. These crops pay for the culture of the ground. The first year's peaches vary from a peck to half a bushel per tree, while 10 bushels are not too much to expect an established tree to yield. The fruit ripens about the 1st of July, and the very earliest sometimes realize from 10 to 15 dollars per bushel. The average price, however, is about 2½ dollars per bushel, which, with 100 trees to the acre, realizes a fair amount of profit. They are packed in 3 feet boxes, and are sent to New York, Baltimore, and Philadelphia.

On the 30th of May I started from Norfolk for Richmond, the fare to which is 3 dollars 50 cents. From Norfolk to Suffolk we pass through what is termed the dismal swamp, a name appropriate enough for a wooded flat country that at one time seems to have been

set on fire to destroy the timber. About Boykins are some splendid trees of *Pinus Laricio*, and larger oak, maple, and liquid-amber forests. Here and there are a few plots of land enclosed by means of a worm fence, and furnished with a few wooden huts of squatters. Proceeding onwards we soon reach some good apple and peach orchards. All the way to Windsor there is, however, but little cultivation; the soil is boggy, some 18 inches deep, resting on white sand. Forest trees of large size, however, succeed on it, and, owing to the great amount of variety which their foliage presents, they have a rich and pleasing appearance, forming in that respect quite a study for the landscape architect. Here may be found the deciduous cypress, 100 feet in height, with a trunk as straight as a gun barrel, *Quercus coccinea*, even larger, *Acer Wagerianum* and *nibrum*, ash, and other trees, all of great size and beauty. Indeed, between Norfolk and Petersburg, are great breadths of naturally planted trees, with which we have nothing in England at all comparable; and he who happens to get a peep at nature's system of massing, as exhibited here, will never, I should think, again adopt the dotting plan. Where the timber has been burned down, peach and apple orchards have been planted. Between Petersburg and Richmond occur large tracks under cultivation. They are cropped with corn and oats. *Rhododendrons* still ornament the glens, and even the tree stumps are not all removed from the cultivated lands. Between New York and Richmond, flat country prevails, and were it not for its finely wooded scenery, there would be little to interest. English mixed grass seeds make good pasture in this district.—*Joseph Newton, Oxford Terrace, Hyde Park.*

THE MANAGEMENT OF THE KITCHEN GARDEN.

WE purpose, in a series of articles, to draw the attention of our readers to the preparation and management of the kitchen garden. We do this more for the benefit of amateurs and farmers who do not employ regular gardeners, than for gardeners themselves. We should be very sorry, indeed, if we did not, however, believe that much of what we may here advance will be found of use to practical men also. In many things, the method we pursue in our garden management will be found to be the same as what is adopted by many others, yet, we believe that in several details we also differ considerably from the general routine. The practical man may, therefore, derive some pleasure, if not benefit, from the perusal of the succeeding articles, for therein he may see the method adopted by others, and can therefore consider between his own practice and ours, and draw conclusions accordingly.

Many books have been written upon this subject from time to time, many of them of the highest excellence and benefit to the gardening world; yet we believe that many of them convey their ideas in too vague a form to be of much benefit to non-practical men. Calendars of operations also accompany many of the gardening periodicals which are weekly and monthly issuing from the press; yet these are too general in their treatment of the subject in hand, being only guides to the times of sowing the various crops, without indicating the management of the same, through the various stages, until the crop is realized. To write out every detail minutely for practical men, would deservedly be considered presumptive, but for those whom we intend especially to address, we believe they will be found of service in not only pointing out the mere outlines of the work to be performed, but in fully detailing to them the time and method of performing every work connected with kitchen garden management. We, therefore,

intend taking the various crops individually, and treating them in as plain and simple a manner as possible, indicating the various times of sowing, how this operation is to be performed, the quantities of seed necessary for a given space, the quantities of manure necessary for the different crops, the spring, summer, and autumn management of the same, with a full detail of the lifting and storing of such vegetable productions as require to be lifted in autumn and stored away for winter use.

Before entering fully into the subject, we purpose, however, to devote the first article to the

PREPARATION OF SOIL,

Indicating what method we believe to be the best for the benefit of the future crop, and having for our object, at the same time, economy of labour and manure. These are objects which ought never to be lost sight of by any one; yet, notwithstanding, we never would recommend either to the injury or sacrifice of a crop. Many persons grudge the manure necessary for the growth of vegetables in garden soil, and complain that gardeners waste dung by putting it in in such quantities as never would be dreamed of by a farmer on his farm. Now, any one who will for a moment reflect upon the different natures of farm and garden crops—as well as this other fact, that in a garden the cropping is a regular thing year after year, whereas upon a farm, as a general rule, the land lies in grass or fallow at least from one-third to one-fourth of its time, and when under crop many of them are not nearly so severe upon the land—but will perceive that we have been arguing from a false starting point. The necessarily perpetual cropping of the garden, and the bulky and penetrating nature of most of the crops, makes it necessary that a very much larger amount of manure is required for it than for the farm. This portion of our subject we

will discuss more fully in treating of the various crops.

The proper management of the soil during the autumn and winter months is one of the very greatest moment to every one who wishes to produce good after results. This fact cannot be too well pressed home to every one who has the management of a garden. The fact is, that to this department of labour a very great amount of attention is given by most of our eminent horticulturists; and we have been repeatedly told by one of our most able gardeners, and one who now fills one of the most prominent positions in the horticultural world, that to do ample justice to the vegetable department, and to produce a regular and ample supply of vegetables all the year round, gave him far more trouble and anxiety than any other department under his charge. Seeing this to be the case, it is not to be wondered at that amateurs and non-practical men—nay, I may even go further, and say many practical men—fail in producing a constant and plentiful supply of vegetables. We have often heard it said of such and such a one that “he was a very poor gardener; knew about nothing except kitchen garden work.” Now, I make bold to say that such a one is more of a gardener, a more profitable man to his master, and one whom most masters will value more, than if he could, by artificial means, produce fruits and flowers, but failed to give a decent crop of vegetables for culinary purposes. Those men who produce good results in the culinary departments almost invariably make good gardeners in the other departments also. But how often is it the reverse where fruit or plant growing is made a hobby; the hobby is attended to, the rest being either neglected or not attended to as it ought.

There is much diversity of opinion still existing regarding the best time for preparing the soil for receiving the crops. Some of our best gardeners recommend this work being left over till spring, and are entirely antagonistic to the autumn and winter preparation, giving, as their reason for so acting, “that snails, slugs, and many other grubs and insects which are pernicious to the vegetable king-

dom, by being dug down at that time of the year, are not nearly so ready to come back to the surface and do damage to the crops;” and further, “that if the soil be of a stiff tenacious nature, that by standing over till spring it is very much easier managed than if dug in autumn.” As we, with the great majority of gardeners, have cast in our lot for the autumn and winter preparation of the soil, it will be necessary to give our reasons for dissenting from the above, as well as our reasons for our own method. In the first place, the *theory* regarding the snails, grubs, &c., will not bear the slightest contrast with *practice*. We have invariably found ground which had lain unturned to produce double the quantity of these pests in spring compared with a piece which had been dug or trenched in autumn. This is not only our own opinion, but also the opinion of a gardener of very high standing to whom we were speaking upon this subject the other day. In the second place, with regard to the working of stiff ground in spring, our experience is quite the reverse to what is stated above, as we have always considered and found that the action of frost, rain, and such like, rendered it much easier managed when the seeding season came round, more especially if the soil was set up in ridges.

It will thus be evident that we are firmly of the opinion that all garden ground ought to be trenched or dug in the autumn months—in fact, as soon as the crop has been removed, so soon may these operations be commenced. We further believe, that if it is at all possible, the sooner thereafter this operation is performed the better it will be for the succeeding crop, and, as a natural consequence, be more profitable for the cultivator. Not only are the autumn and winter months the best for these operations, but they are also the most convenient. If the digging and trenching be left over till spring, the probable consequence is, that it is hurriedly and slovenly done, as operations of a different and, at the same time, pressing nature present themselves; and in order that all may be got done, none of them are performed as they ought to be. This is a weighty argument in

of autumn and winter digging, yet all arguments of an equally weighty nature will follow. The want of management in the garden, and the non-attention to regularity and order in performing many of the operations connected therewith, is the reason, often a very patent one, why many gardens present such a rough and untidy appearance during the summer months. The proper management and disposition of the soil of the garden is of primary importance. I have seen several places where gardeners, who were considered to be first-class men, were constantly in a muddle—the whole garden very untidy, the crops never got in proper time or condition, and yet every one on the place as busy as possible. We have seen such places change hands, and the new owner, who, perhaps, were not considered to be first-rate gardeners succeed to the situation. The same number of hands were employed as to the former man; the hands engaged in the same kind of work, but the results were very different. What, I would ask, was the cause of the change? The answer in one word will answer the whole matter—*management*. The later man always made it a point to do everything in regularity and order; to do everything in its proper season and time, *never allowing the work of to-day to be put over till to-morrow* if it was possible to have it performed. In this way, and by his attending to these things, he was enabled “to bring order out of disorder,” to produce good and regular crops, and to have the garden in an orderly and tidy condition at all times.

So much for good order and management; now we come to discuss a point of more vital importance still. It has been admitted on all sides, that the more the soil is laid open to the influences of the weather—that is, to light, frost, snow, and the like—so in like ratio its fertility be increased. This is the object the farmer has in view in allowing his land to lie in fallow for a time, and this he accomplishes to a certain extent by allowing his fields to lie in grass for a succession of years. It is almost impossible for the farmer to accomplish this; yet he has it

in his power to do the next best thing within his reach, viz., to dig and trench at the earliest possible time, and allow it to lie in this condition as long as he can. As a rule, all soil is pretty firmly baked together when the crop has been removed, and, in this state, is not in a fit condition to derive the same amount of benefit from the external and surrounding circumstances, as if it were trenched or dug. In this hard-baked and caked condition, the rain which falls and ought to pass through it very gradually, either passes through it and is gone, or what is more often the case, runs off to a considerable extent, if there is a slope to carry it away. Now, it is a well ascertained fact that rain water contains ingredients which are not only highly beneficial to, but absolutely necessary for, the members of the vegetable kingdom, so that he who has not his soil in proper condition for receiving and absorbing therefrom, is losing that for which he will require to pay the manure merchant. To speak more plainly, let me shew the reader what is contained in every cubic foot of rain water, and then he will be able to judge for himself. Of nitrogen, there are from 10 to 12 grains; of nitric acid, about 26 grains; of ammonia, about 5 grains; of chlorine, about 3 grains; of lime, about 9 grains; and of magnesia, about 3 grains. These facts speak for themselves, and require no comments of mine. Where the average rainfall is about 30 inches, it will be evident that two and a-half times the foregoing quantities will be imparted to the soil during that period. It should, therefore, be our endeavour, not so much to get the rain to pass *from* our soil as it should be to get it to pass *through* it. As we already said, frost, snow, and such like, also have a sweetening and ameliorating tendency, and the more the soil is exposed, the better will be the results.

In preparing the soil for the various crops, we consider a regular three years' course of preparation to be the best. The first year we would recommend trenching to the depth of three spits, and incorporating with the soil, from top to bottom of the trench, the manure considered necessary for the following crops, which we would recommend to be of a deep-rooting and penetrating nature. The second

year, two spits deep will be enough to trench, incorporating the manure as in the former season, and selecting for this year's crop a deep-rooting vegetable, but not of so penetrating a nature as the last. The third year, digging one spit deep will be all that is necessary, and the crop selected should be more of a surface-grower. If the soil is in good condition, and the crop to be grown not a rank feeder, it may not be necessary to give

any manure. This is the course we recommend, and consider it much better than trenching alternate years to the depth of three spits, and the next year digging only one spit deep, as by our method the whole soil to the bottom of the trench is regularly turned up to the surface once in three years; whereas, by the other method, the bottom and top spits only change places every alternate year.

WHEN SHALL WE MANURE OUR ASPARAGUS BEDS?

THE amateur gardener who consults any of our old works on horticulture, will find that most of the "authorities" recommend that the asparagus bed shall be manured in the fall after the haulm or stems are cut. The objects to be attained by this are two-fold, viz.:—the nourishment of the plants and the protection of the roots from the winter's frost. On looking over the more recent works, such as Henderson's, we are told that to manure in the fall is to waste our fertilizers, and that the proper time to manure is in the spring. Our own experience leads us to believe that manuring in the fall is a wasteful process. If we had a supply of guano on hand we would have no objection to manuring in the spring before cutting the shoots for use, but as we generally employ barn-yard manure, we decidedly object, on the score of delicacy, to any such proceeding. It is true that the best and most efficient of all fertilizers, liquid manure, may be applied in spring without being *apparently* open to this objection. We have found, however, that the flavour of the asparagus is injured by heavy spring manuring, and we have therefore adopted another system which we believe to be founded upon a more correct view of the principles of vegetable physiology.

The main thing that will influence the size and quality of the spring shoots is the character of the previous summer's growth. Of this we have had ample proof. No amount of

manuring, either in spring or fall, or both together, will enable us to procure a supply of well grown shoots from a bed which made but a feeble growth during the previous summer. At the same time, we have frequently obtained shoots of the best quality without the use of any manure during the spring in which they were cut, but these shoots proceeded from plants which had shewn extra vigour during the preceding summer. If we trace the results back to their cause, we will probably find it to be something like this:—The current spring's shoots owe their vigour to the character of the roots which produce them more than to anything else; the quality of these roots depends upon the extent of the previous summer's stems and foliage; and the extent of these stems and foliage depends upon the amount of food given to the plant during the early part of the growing season. Hence our plan has always been to manure in the spring, after the cutting season is over. In this way we avoid all disagreeable associations and bad flavours, and the result is every way more satisfactory. Based on these principles, our routine of practice is as follows:—

In the spring, after cutting has ceased, we apply, during a rain if possible, a pretty heavy coating of good rich manure, and during the rest of the season, whenever we have a supply of liquid manure on hand, that is not needed for other purposes, the aspara-

gus bed stands ready to receive it. In this way we grow an immense amount of haulm—last year (1869) one shoot stood 11 feet 6 inches from the ground to the tip. It may of course be asked, why try to grow so much stem when it will all be cut away and thrown aside as worthless? Simply because we have found that the more foliage a plant possesses the more extensive and vigorous will be its roots. After the stems are quite dead we cut

them over and cover the bed with straw, corn stalks, or similar matter. We are satisfied that a well protected bed always does better than one left exposed to the freezing and thawing of winter. In the spring, the bed is cleared off, deeply raked, or lightly forked, and well sprinkled with salt or old brine. Nothing then remains to be done except to cut the asparagus, which is clean, and nice, and well flavoured.

Work in the Garden during April.

From "THE VILLA GARDENER."

THREE welcome, laughing—weeping—hopeful April! Come with thy warm breath and glistening sunbeam, and bid our plants live a new life, and be clothed in the fresh tenderness of spring beauty. April comes forth like a child, with its mixture of smiles and tears—joys and sorrows—chasing each other through its fast-fleeting hours. Like childhood, too, it brings with it for its guardian the gardener, much work and many cares. It is a delightful, but withal a wilful month. Its sun has almost a summer tide's energy, and the dark storm clouds are heavily freighted with the battering hail-storms of biting March. "Rejoice with trembling" is a good garden motto for the month. But the month has its work in plenty, as well as its morals and motives, for the observant and the thoughtful.

With the fresh flowers and bursting leaves of April should come a thorough freshening up and cleaning of gardens. The last traces of winter should now be driven out of villa grounds. Every dead leaf or branch picked or cut off; all winter-beaten soil hoed, dug over, or raked out, sweetened, and freshened; walks top-dressed, with a sprinkling all over, about an inch thick, of the cleanest, brightest gravel or broken spar; or turned over, hoed up, and raked smooth, and finally rolled into smoothness. All roads and walks not thus transformed into freshness should be scrupulously swept and edged (that is, about half an inch cut off their turf verges or sides with a sharp spade or circular knife), and heavily rolled.

All the grass about the place must now be swept and rolled into perfect smoothness, and mowed every week throughout the month, and indeed every week from April till November. It will then continue always perfect, like a velvet-green carpet with the shortest and finest nap—clean—elastic—charming.

KITCHEN GARDEN.

Plant out cabbages, lettuce, cauliflower, all of which are now offered plentifully and cheaply in the market. Plant or remove all herbs, and finish planting asparagus, seakale, or rhubarb. Plant nasturtiums, so beautiful as climbers, so useful in flower and leaf as salad; and the seeds such a good substitute for capers, as a sauce for leg of mutton.

Seed Sowing.—Choose a dry day for the operation. Sow in a dry soil, if possible; cover them with earth at least the thickness of their own diameter. Sow tolerably thick. Some seeds do best on a light bed, others on a hard one. The latter is especially the case with onions. Villa gardeners mostly grow these in beds of from 3 to 4 feet wide, and of any desired length. An ounce of seed will sow two beds 3 feet wide and 20 feet long. The ground should be trod or rolled quite firm, then a rake merely scratched over it, and the seed carefully scattered over the surface so formed. In bed culture, a space or alley 1 foot or 15 inches wide should be left vacant between the beds, and around them. From these vacant spaces, a small portion of fine earth is taken up in layers about 1½ inches thick, and regularly disposed over the whole surface by the spade. By a skilful movement this earth is then sprinkled or sown regularly over the seeds. The whole bed is treated in the same way, throwing the earth out of the central alley in equal portions, and taking off the side path to finish covering the outer edges. The surface is then smoothly raked over, and patted smooth, either with the back of the spade or a light roller. The edges are then lined off, and cut straight with a spade, the alleys raked smooth, and the beds finished off in a workmanlike manner. All crops grown in beds are thus treated, so that it will not be needful to

repeat these instructions. But onions, and indeed nearly all other kitchen-garden crops, do equally well, and are easier cleaned, grown in drills. The drills for onions may range from 6 to 10 inches apart, and should not exceed $\frac{1}{2}$ inch in depth. They can be made with Le Butt's hand drill, or by stretching a common line tight, and then drawing a mark or drill with a rake handle, or a small draw-hoe. We have long used a wooden rake—such as is used for hay—with the teeth a little larger than usual, and placed 10 inches apart. The line is thus only used for the first start, after which the outside tooth is kept in the last made drill. Each time of drawing we do six rows abreast, until the whole ground is serrated with tiny drills. It is then sown and covered in with the feet; one foot is carried along on each side of the drill, the toes being used to replace the earth on the top of the seed, and the two heels meeting above it and making it all firm. If the ground is dry enough, tread it all over again, or roll it. Finally, take off all stones, and smooth all to a dead uniformity with a fine rake, that is, with a rake with teeth about $\frac{1}{2}$ or $\frac{3}{4}$ of an inch asunder.

Carrots, parsnips, &c., should be sown in drills, and trod in in the same manner, only they should not be less than 15 and 18 inches apart, on good ground. A solid bed is of less consequence for these plants.

Potatoes, &c.—Plant potatoes at distances of 20 inches or 2 feet apart, throw up ridges with the spade a foot or 15 inches high, and of this pattern. This gives a long southern slope, with an abrupt short northern line. At the asterisk, cut a small opening with the spade 6 inches deep, and insert whole potato sets just breaking into growth. Put the earth back upon the sets with a spade or rake; scatter a few seeds of Early Frame radish over the ground, and run a rake over it to smooth the surface and cover the seed. The sunny side of these potato ridges is the best possible position for the first crop of radishes. A few of the potato ridges ought to be sown with such lettuces as the Brown cos, and the Drumhead cabbage, so that radishes and lettuces might be had as a catch crop off the ground before the potatoes require it wholly for themselves.

Lose no time in getting in full crops of potatoes. Their name is legion, but perhaps for the villa garden there are no better kidneys than Yorkshire Hero, Pince's Royal Ash Leaf, Lapstone, and Mona's Pride. For rounds, choose Milky White, Dalmahoy, Early Victoria, and York or Pater-son's Regent—the two last for late keeping. Choose good strong tubers for seed. Cut them up into sets, that is, large pieces having one strong eye in each; lay them up then for a day or two, and sprinkle the raw edges of the sets with dry ashes or quicklime.

Peas.—Sow in the first and again the last week, in

drills 4 inches deep, and from 4 to 6 feet apart, the main crops of peas. A single pint will furnish a row from 10 to 20 feet in length. Carter's First Crop, or Advancer, and Hair's Dwarf Mammoth, Veitch's Perfection and Ne Plus Ultra, are very suitable kinds.

Broad Beans.—Sow a few drills, a foot apart, of Beck's Gem, a dwarf variety, growing about 1 foot high. If space permits, a row or two of Green Windsor may also be sown in rows 3 feet apart.

Kidney Beans.—Sow now under hand glasses, and at the end of the month in the open border; also Scarlet Runners, one of the best and most profitable of all the vegetables.

Leeks.—Where appreciated, these may be sown in a small bed to forward them for transplanting.

Turnips.—Sow early kinds. The Red Stone is a very sweet early variety.

Borcolos, Savoy, and Cabbages should also be sown in the beginning of the month. It is likewise a good time, as already stated, for planting cabbages that have stood the winter, which are at this season generally offered in the markets for sale. A few seeds of cauliflower may likewise be sown in a warm corner.

Carrots, Parsnips, &c.—Sow main crops. James's New Scarlet is the best. Early French Horn is good for drawing young. All the parsnips that it is intended to grow should be put in now, as they require a long season to finish their growth. Hollow-crowned is the best variety. The drills for these may be fully 1 inch deep.

Beetroot.—Every villa gardener should likewise grow a few rows of beet. Nutting's Dwarf Red is one of the best varieties. It may be sown in a bed like carrots, or in drills 1 foot or 15 inches asunder, and thinned out to 12 inches in the rows. It will be full-grown in September, and when carefully boiled *four hours*, and sliced thin, when cold, it makes a charming addition to a salad, and forms an excellent condiment to cold meat, served alone or with vinegar and white sauce.

Onions.—Of onions for the villa garden, perhaps none are better than James's Keeping for the main crop, and White Spanish for immediate use in the autumn. The main crop of onions or parsnips should always be got in in March: they may, however, still be sown. Silver-skinned onions should be sown on a poor piece of soil, for pickling.

Those who grow ridge cucumbers, vegetable marrow, tomatoes, chilies, and capsicum, must see to sowing them at once. These should be sown in pots in a frame where heat is generated by fermenting material, or in a house, and got up strong before being planted out.

Sow also celery for an early crop.

Look out for and destroy all snails, slugs, or other vermin. Keep a hoe moving among growing crops, and destroy every appearance of weeds.

THE FRUIT GARDEN.

Wall trees will require attention, and coverings gradually removed by the end of this month.

One of the chief duties to trees at this period is to keep them clear of insects. It seems often that, for every leaf formed, a hundred insects spring forth ready to feed upon the tender morsel. It is our place, as villa gardeners, to defend the leaf by destroying utterly, and without mercy, every insect of whatever kind that would injure a hair of the leaf's surface. To this end watch for the first appearance of greenfly, or caterpillar, or grub. Pick off the latter, and dose the former to instant death with tobacco tea. That is, buy the washings of tobacco—tobacco water from the manufacturers. Add 3 gallons of water to every gallon of the nasty mixture, and scatter it over the shrubs and leaves with a syringe, so that all are wetted. A few doses of this kind will destroy all vermin, and enable the young shoots and tiny fruit to grow in peace. In a few days after the tobacco dressing, forcibly and strongly wash the trees and walls with clean water, sent against them with the full force of syringe or tiny engine. This will cleanse the leaves, and remove all sickly and very young insects from their hiding place, and clear the trees for the season.

Pruning—This, in the usual acceptation of the word, should now be completed. But pruning, like woman's work, is never done. But what is called winter pruning—that is, the cutting off portions of last year's wood—should be completed early in the month, though some defer pruning apples to the end of it, for the purpose of retarding or keeping back the bloom. When pruning is thus deferred, the buds at the end of the spur break into leaf, and thus keep back those at the base. When the former is removed by the knife, the latter breaks into leaf or flower at a later and more genial period; and hence they have a better chance of escaping spring frosts. But it is not of such pruning that I would now write, but rather of disbudding, which mostly takes the place of pruning during April.

Disbudding.—On all such trees as plums, peaches, cherries, nectarines, that bear chiefly on the preceding year's wood, fruiting shoots are left from 12 to 18 inches in length. On these, perhaps, there may be as many as a dozen strong wood buds break into full growth. Now is the time—about the end of April—to begin to reduce their number. This should be done gradually, one or two at a time, at intervals of a week, leaving always the cleanest best-placed young shoots to form fruit-bearing wood next year. It is also needful to stop the main shoot of this branch, when it appears to grow too quickly, with the view of breaking up the sap and distributing it into various channels—say three or six instead of one only. This enables the tree to fill its allotted space much sooner. Where grape vines are growing, they will likewise require slight pruning. Also the tendrils should be removed from the bunches, and the side shoots should all be stopped growing one leaf beyond the bunches. In all such April pruning no knife will be needed, the finger and thumb being sharp and strong enough for all these

operations. Apricots sometimes lose limbs during this month very suddenly and unexpectedly. When this happens, the sooner the dead limbs are removed the better for the sightliness of the wall and the health of the trees. Every thing dead in garden and shrubbery should disappear during the month.

Fumigation.—Insects, especially green-fly, are very troublesome on the tender young growths, and the best remedy is to fill the places full of tobacco smoke. Place a few hot ashes in the bottom of a common garden pot, and place it quickly among the plants, and shut down closely. This will do for small places. But in large places, buy a fumigator, with a long tube, from any seedsman, and introduce the end of it through a hole in the wall, and blow away until you cannot see a leaf through the glass. In such a dense cloud of smoke every green-fly must cease to breathe. Wash the plants heavily next morning to remove the dead and dying vermin from the plants.

THE FLOWER GARDEN.

Roll and sweep grass and gravel, and make all as bright and beautiful as possible. Snowdrops will be fading, and crocuses and anemones in full beauty. Myosotis, arabis, aubrietias, alyssum, daisies, early tulips, hyacinths, and pansies, of the earliest kinds, will now be unveiling their beauty, if planted and tended as they ought to have been. All these will be sources of present pleasure; and much of April doings will consist in the fondling and admiring of these spring-tide beauties.

Finish pruning roses, plant out hollyhocks in good soil. Dig all the empty flower beds, if not already done, and manure them as if for a crop of cabbages. Flowers take as much out of the earth as any other crop, and the foundation of floral beauty is laid—tell it not to our lady readers—in the muck heap. Sow, in warm sheltered spots, small quantities of such annuals as the following:—*Nemophila insignis* and *maculata*, the best varieties of candytufts, sweet alyssum, *Calliopsis Drummondii*, *Eschscholtzia californica*, and the white variety; one or two varieties of *Gilia tricolor* and *Schizanthus pinnatus*, *Clarkias* of sorts, *Collinsias*, larkspurs, love-lies-bleeding, prince's feather, lupins of sorts, *Ænothera*, *Saponaria calabrica*, Scabiouses or ladies' pincushions, Virginian stocks, Venus's looking-glass, sweet peas, canary creepers, and indeed all sorts of tender and hardy annuals. Don't forget mignonette and stocks for sweetness; asters, marigolds, and candytufts for their beauty. Plant out pansies, pinks, carnation, picotees, &c.

We have tried to make this list as select as possible not to frighten villa gardeners; and have kept as much as possible to popular names. There are many more hardy annuals equally good, but these may be bought for a few shillings, and are easily grown and very showy. They may be either sown on a warm sheltered spot, and transplanted when two inches high, or they may be sown in small circles or lines where they are to remain. Sweet peas require the same treatment as other peas. They are all hardy as the

hardest of the edible varieties, and should be sown where they are wanted to flower. The *Nemophilas*, *Clarkia*, *Saponaria*, *Virginian stock*, &c., form nice boundary lines to a villa garden, and are admirable illuminators of flowerless shrubs.

PITS AND FRAMES.

Most villa gardeners have one or more of these to help them to furnish the flower garden with beauty, of the right and fashionable kind, in summer. These structures are probably filled with *verbenas*, *calceolarias*, and *pelargoniums*: these are the three great families that make summer or autumn garlands of glory for the modern flower garden. Well, about the beginning of the month the *calceolarias* and *verbenas* must find a temporary shelter outside. We must have a portion of the pits, at least, for increasing the stock of *pelargoniums*, and raising such seeds as *Lobelia speciosa*, *Phlox Drummondii*, *Portulacas*, *Petunias*, *Zinnias*, and other flowering plants, as well as such foliage things as *Perilla nankinensis*, the high coloured *Amaranthus*, and castor-oil plants. Common garden pots filled one-third full of broken potsherds, succeeded by a layer of moss an inch thick, and filled up to the brim with any light sandy fine soil will do for these seeds. Then take a pot about the same size, place its bottom on the top of the fresh soil, and use it as a rammer, running it all over the earth two or three times until the surface is level and hard; then scatter the seed carefully over the area of the pot, and take a sieve of the finest mesh, place a few handfuls of soil in it and gently sift it over the seeds. The merest sprinkling will suffice, and as soon as the seeds cannot be seen, no more earth must be applied. Practised sowers of seed dispense with the sieve, and scatter the covering soil broadcast with the hand, as a farmer used to sow corn before sowing machines became universal; but a small sieve is safest for beginners. Never forget the rule, the smaller the seed the less covering, and *vice versa*. Such seeds as castor-oil plants, may be pushed under the soil like broad beans, and will grow freely if planted 2 or 3 inches deep. Such seeds as *Lobelia speciosa* must not have more than the thickness of a line of earth.

After covering, the bottom of the pot may be again applied to make the surface firm and smooth. This firmness is of great importance, as it enables the seeds to bite the soil, and seems as helpful to the progress of their young life as sand is to the locomotive on frosty rails. No water at sowing on any account should be given, and it is better to shade from the sun than to water until after the seeds vegetate. If the soil is in the right state, little or none will be needed till the plants appear. They must then be watered through a rose so finely pierced that it will send it down upon the tender plants like water dust rather than rain-drops, because an injudicious watering will uproot the tiny plants. The place for raising such seeds should not be hotter than from 55° to 60°, and this temperature should be maintained as nearly as possible during the early stages of the seedlings. The

cold may be kept out by covering with mats, the heat kept down by giving air as it is called—that is, by pushing the glass down or lifting it up, so as to allow the artificial and natural atmosphere to mingle freely and become assimilated in temperature.

Dahlia roots should now be started, to get some cuttings; and where there is only one glass-house, many tender annual cuttings of *geraniums*, *pelargoniums*, *verbenas*, &c., had better be increased during the month of May. Many villa gardeners are, however, chiefly florists, and devote their places to such florists' flowers as *auriculas*, *picotees*, *pansies*, &c. This is the great flowering period for the choice *auriculas* of the florist under glass; and to bring out their colours they should either be moved to a stand outside, with a northern aspect, or the glass must be closely shaded from the sun. Give air; remove offsets; transplant seedlings of *picotees* and *carnations*; guard against birds, which often eat out the hearts of the plants at this season. Sow pansy seed. Plant out winter-stored plants; remove offsets, and put in a few cuttings. Established beds will now be in full bloom.

Polyanthuses in pots will require liberal waterings; many of these are exquisitely beautiful, and will well repay the trouble bestowed upon them, either in pots, beds, or borders.

GLASS HOUSES.

Almost every Villa Garden has its house of glass—its crystal palace—for preserving and exhibiting the plants selected for culture. All *primroses*, *pelargoniums*, *cactuses*, *calceolarias*, *camellias*, *carnations*, *picotees*, *heaths*, *roses*, *epacris*, *cinerarias*, *azaleas*, *echeverias*, *verbenas*, *auriculas*, *polyanthuses*, *chrysanthemums*, *oleanders*, *cytisuses*, *hyacinths*, and a whole host besides are villa plants. Our advice concerning all, this month, is simply dress and pick them. Dress by the removal of dead leaves, the scraping off of the mossy surface of the soil, the placing of a little fresh earth as a top-dressing, the washing clean of every dirty pot, the scrubbing of shelves, stages, floors; and, in fine, by scrupulous cleanliness of plants and house from top to bottom. Keep them well watered, free from insects, and freely aired, that they may push along with vigour during the month.

Some of the flowers will be in bloom: keep the flowers dry if you wish to preserve them as long as possible and to keep them unspotted. Such plants as *cinerarias* will require liberal watering daily as the pots are now full of roots. The more roots and the greater their activity, and the larger and thinner the leaves, the more water the plants will drink up. This elementary principle reduced to practice in villa glass-houses will suffice to regulate the supply of water in accordance with the demand throughout this month. Scarcely two plants of different families need the same quantity of water. Give to each so much as it can fairly use, and see that it has no more until its last drink is utilized. Avoid for your plants the two extremes of want and excess, and health, strength, and beauty will be found in the happy mean between them.

The Stable.

LAMENESS IN HORSES.

BY JOSEPH GAMGEE, SENR.

I HAVE read the article which appeared in the *Country Gentleman's Magazine* for , on the operation of neurotomy, instigated by a correspondent of the *Field*. I will venture to assert, and then adduce facts and reasons to shew, that there has been no operation recorded in the history of veterinary medicine, or by the older farriers, that deserves better condemnation as the one in question.

Firstly, because it was from its origin a desperate measure, hastily adopted and uncritically eulogized, though urged on irrational grounds; and, secondly, because it has failed from the first, as inevitably it must do in all cases to come, as long as such maiming be permitted. The new operation was, from the first, and still is, to the limits to which its utility is reduced, altogether English; and, to say the least, the conditions of horses' feet, and the amelioration of which it was a supposed measure, are also, to a great extent, peculiar to this country, or at least are manifold more common to us than in any other country.

My own apology for intruding and speaking reservedly on this subject now introduced, when it was hoped that it had been forgotten, is the length of time which has since died out of memory, is the length of time which I have witnessed all the phenomena in the history of the foot, which led to, and the consequences that followed, its adoption. Although I have, if any, have seen more into the superfluities and obvious demerits of the operation, hundreds have seen it more frequently performed, for I have shunned it; but until I had seen it carried out extensively, and the destruction of valuable animals, of which admitted of perfect restoration by less and ready means.

The *Field* correspondent lays stress on the cases being well-selected for the operation, while I insist that, however selected, they will all be the wrong cases, or rather, the cutting out of the nerves the wrong measure. That plea—proper selection—was set up from the first, when the poor animals with diseased feet, the causes of which were not understood, were made unconscious of their state by deprivation of sensibility. In these unnatural conditions horses lost their hoofs, fractured bones, and tore asunder ligaments, by exerting their force on diseased structures; then came the excuse that the cases were badly chosen. Having heard of the operation soon after it was first extemporized, about 1817, and then seeing it performed weekly by the originator, six years later, while the earlier enthusiasm had scarcely subsided, I used my own eyes, and other senses, for the purpose of forming my own opinion, and concluded, that only in some cases of lame horses, destined for breeding purposes, should it be attempted; and I was convinced that, recommended and carried out as it then was, it amounted to unexampled cruelty; and, besides being destructive to the horses, it blunted the sense of practitioners, and drew their minds from the real requirements of their art, the cultivation of knowledge of foot diseases, their causes, prevention, and cure.

Now for two typical examples of how nerve-cutting kills, and I shall not seek to multiply the number, though I could easily do so to a greater extent than I wish. With the views formed as above stated, I had recourse twice to the operation in the early part of the forty-six years of my career as a veterinary surgeon.

surgeon. Case 1st. Soon after I settled in practise at Florence, I bought a lame race-horse for 200 francs, with the view of exhibiting my skill in rendering the animal painless. After applying myself to restore their condition, I unnerved both fore feet. The horse at once walked freely, and great care being taken, the operation was successful, the local cuts soon healed, and I began to ride the horse, walking him only, and with careful selection of ground. The horse became admired for his fine condition and figure, and those who knew him before could scarcely recognize him in his improved appearance. At length, one afternoon I was riding him quietly in the *Cacine* (the Park), when a gentleman, an expert horseman, approached me and exclaimed, "Why, Gamgee, is that the horse 'Kitter?' I never knew such a change in any horse;" he continued, "Do you know that he was the fastest horse in Lord Normanby's stables?" He then set his own horse into a gallop, and instantly my horse made a rush to join him, and went about two hundred yards before I could stop him; in the meantime, I had felt his fore-feet give way. I dismounted, and saw that all was ended with him; he had used his fore-feet as if they had been composed of cork, and had literally crushed them. Feeling intensely ashamed of myself, I led the horse with difficulty to a place where I could terminate his existence without delay. On dissecting the feet, I found that the bones were broken into fragments, as small as if they were composed of pumice-stone.

Case 2d happened at Edinburgh; the subject was a mare belonging to a cab proprietor. On a winter's evening, about seven years ago, one of the proprietor's men came for me to go and see the mare, which he said had cast one of her hoofs, and he drove me to the cab-stand in Queen Street, where I found the mare standing, not apparently in much pain, on the stump of the pastern bone, torn out of the socket from the bone beneath, and the remainder of the foot was turned up in front of the stump. How, and when, did this happen? I asked. Nobody knew. The mare had been driven with a cab, engaged from the

stand at Randolph Crescent, and was going along Queen Street, when the cabmen on the station there saw and heard the foot dangling, with the shoe attached, and they called to the driver, who confessed that he had discovered that something was the matter as soon as he started from the last station. The bone was much worn away by friction on the ground—proof of the great distance the mare had traversed in that state. I put the animal out of its then condition in life as easily and speedily as possible, when I discovered that the same kind of injury had been sustained by the other fore-foot, only that the ligaments had held together, and the bones, though broken into many pieces, had not become much displaced. Such is another result of unnerving.

The reservation in forming an opinion in early years as to the possibility of the operation being useful in some cases, where the animals were intended for breeding purposes, long ago received a negative solution from experience. Cases of lameness, from whatever combination of causes, which resist curative and palliative measures when scientifically adopted, are no cases to be benefited by such a desperate procedure as that of cutting away the organs of sense, and leaving disease and the causes to augment.

My denouncement of the operation in the terms I do, unconditionally, will not encounter entire approval, and there are some to whom persuasion may not be welcomed. All humane people, and intelligent horsemen, including every respectable member of the veterinary profession, should, however, require little, beyond the use of common sense and observation, to induce them to discountenance the practice. But there are two parties not so readily to be persuaded, viz., those who will perform any operation for the fee it brings, and those who employ such men to destroy sensibility in their horses' feet by extirpation of nerves, so that they may conceal the real state of their lame horses, and sell them at the highest possible price. We have, therefore, conjoined, cruelty and fraud as effect and motives of a procedure which is a national disgrace.

The Dairy and Poultry-Yard.

ON SOME POINTS IN BUTTER-MAKING.

THE handling of the cream, the putting it up in the dishes, and its management during the process of souring, are all points which require the greatest attention. Many good lots of butter are spoiled by want of attention to these, especially the last named point. Very frequently, also, the cream acquires a taint by being allowed to stand too long on the milk before being creamed, this being done with the view of increasing the quantity of the cream. After a certain period, the rise of cream ceases, and this, even in warm weather, is long before a taint can come to the milk. An experienced dairymaid will be able at once to say when the milk should be creamed. The greatest care should be taken in the management of the cream as it is put up to sour in the crocks or pans. Each successive portion of cream should be gently poured into the vessel, so as to avoid the splashing of the cream upon the sides of the vessel; and should any cream get there, it is imperatively essential that it should be wiped carefully off, and, it is needless to say, with a scrupulously clean cloth. And as the collected cream in the vessel is stirred from time to time, to make the whole as uniform as possible—some object to this stirring, although we think it essential—it is necessary after each stirring to wipe the edge carefully all round. The object of all this care is to prevent any portion of cream adhering to the sides of the vessel above the level at which the collected cream stands; for, if any portion is left, it becomes rapidly putrid, and invariably taints the cream in the vessel. Many a good lot of cream has been spoiled in this way; and a taint, no matter how obtained, lessens the value of the

butter; for it is not—even with the most skilful management—rarely, if ever, got wholly rid of. “Prevention is better than cure.” All this and the other points to which we have adverted, in the course of those brief papers, shew the necessity of attending to thorough cleanliness in all the operations of the dairy.

We now come to offer a few remarks upon the churning. And here we would state that we do not believe in quick or rather rapid churning. We have, of late, been accustomed to the advertisements of churns, the great merit of which is stated to be that they produce the butter in a very short time. This quickness is very delusive, it conveys the idea that something is gained; but the point is not, is time gained? but is the butter in the condition in which it should be? To do work quickly is not always to do it well; on the contrary, we are inclined to say that, as a rule, good work almost always includes the outlay of patient labour. But this notion of quick churning as the right thing to aim at proceeds from an ignorance of what the points involved in butter-making really are. Quickly made butter may be good enough if it is to be used at once, but it will not keep well. The reason is simply this—that all the buttery particles of the cream or milk are encased with thin pellicles of casein or the cheesy particles of the milk; if these are allowed to be in too great a proportion, the butter has that cheesy flavour which we all dislike so much; and this will be the case if the churning is done so quickly as to fail to break up or separate the casein pellicles from the oily or buttery particles—this perfect separation can only be effected by slow churning. Of course there is a medium; but we should be inclined to put the minimum time in which

the churning operation is to be kept up at thirty minutes ; between this and forty-five or sixty minutes, if the butter "comes," then the quality—other things being equal—will be good.

Which of the two modes of making butter is the best, that which uses the whole milk, or that which uses only the cream? is a question often asked. Each mode has its advocates, who claim for it, that it is at once the most economical and the best butter-producing. Taking the evidence as it stands, we suspect the balance is in favour of the mode in which the butter is made from the cream, so far at least as the quality is concerned. In large dairies, where many cows are kept, the churning is much more easily managed when cream is employed ; on the other hand, there is more trouble in placing the milk for raising the cream, and taking it off and storing it up till ready for churning. This brings us to another disputed point in butter-making, whether it is better to churn the milk or cream—for this point applies to both—in a fresh state or soured? Here, again, the balance appears to be in favour of souring the cream.

When the cream is used to make butter, the temperature at which the milk is placed for the cream to rise is a matter of great importance. This should be kept as uniformly to the same degree as possible. This temperature varies according to various authorities, but not much, the range being from 60 deg. to 65 deg. The mean between these we think the best, or say 62 deg. Where a ready sale for the immediate consumption can be got for the butter, cream may be raised more quickly, and in much larger quantity, than by the uniform and low temperature method, by boiling the cream, or rather, nearly boiling it, and then allowing it gradually to cool. But this method is not to be pursued when butter of the finest quality is desired, or where it is necessary to keep it long : for cream thus obtained possesses more of the casein or cheesy particles of the

milk than when properly mixed ; so that the butter has not the finest flavour, nor does it keep so long. There is considerable difficulty in securing the uniform temperature desired in a milk-room. A good deal depends upon the position of the dairy itself. It should be in a position, if possible, sheltered from the direct rays of the sun. If exposed, none of the windows should look south, the whole of them being to the north. The walls should be double, especially to the south, and a verandah all round will tend materially to keep the sun's rays from the walls. The ventilation should be as complete as possible, and a double roof should on no account be omitted if perfect results, or as near perfection as is attainable, be looked for. The modes of maintaining an equal temperature in the milk-house are obviously different in different seasons. Thus in winter, the air has to be warmed to bring it up to the temperature required ; in summer, it has to be cooled to bring it down—two exactly opposite processes. The best mode of warming the air in winter is to have a hot water apparatus ; and in summer to have troughs in which the milk dishes are put, and in which troughs cold water is allowed to run slowly along, gradually removing the water as it is warmed, replacing it by colder water. To those who object to such expensive arrangements, it may be some satisfaction to know that, by being placed in an appropriate locality, by the use of double walls, windows, and doors, careful drainage, and good ventilation, a wonderfully uniform equality of temperature may be maintained in the building. A cellar, it is needless to say, is the best place, without the use of special arrangement, for keeping up a uniform temperature, and the deeper it is the better. There are, however, objections to a cellar when used as a milk-room, from the inconveniences in easily working the place. Much of this might, however, be obviated by having a "lift" to raise and lower the milk. Some have an incline to facilitate the working.

The Country Gentlewoman.

LETTERS TO FARMERS' DAUGHTERS.

I.—EVERY DAY MATTERS.

DEAR GIRLS,—I propose to talk to you in this letter upon house-keeping matters in general. How much and less distasteful household duties are made if they were entered into more!

See a young girl washing dishes, dressing tables, sweeping and dusting, with care of her fingers, and disgust marked on every feature, does not give one an agreeable impression of either her temper or her sense. I do not deny that there is a great deal of domestic work that is far from agreeable, so there is in every department of it. Therefore it becomes the part of wisdom to study despatch, neatness, energy, and carefulness; also the very best method of performing these duties.

Labour is performed with much better cheer when some definite object is in view. If it is for *love's* sake, to lighten the load of a patient mother, or to save the expense of a domestic servant to an already overburdened family—this might make you sing while you work. If you are hurrying through the household duties, to get time for study, music, recreation, or to earn something towards some long-cherished plan—*this* will give you energy to your step and courage to your

work. You will study *system, order, and punctuality* in your household arrangements, you will save much time, strength, and worry. As far as possible, certain days should be devoted to certain duties, such as cleaning and polishing the cupboards, brightening the silver, sorting and mending the linen, &c. The avoidance of holders, both for ironing

and handling kettles and cooking utensils, will save time and your hands. A mitten made of stout woollen cloth, kept hanging by the fire, is invaluable, if you care to keep your hands nice and comfortable. A sensible girl will not hesitate to put her hands to anything that may be needed, yet she is right in trying to preserve their beauty and neatness. A little Indian meal rubbed upon the hands when washing, with the aid of a nail brush, will do much towards keeping them nice.

Farmers' daughters are expected to understand housekeeping, but sometimes a hard, barren life of toil begets in them a disgust, which leads to extreme carelessness and indifference in the nicer parts of home duties.

Beware of this, I pray you. Study grace and beauty in the folds of a curtain, the arrangement of a table, the position of a chair—the amount of light and shade to give the right effect to all. Take the *prettiest* way of doing things, and you will soon discover a charm in toil, and the effect on your own nature will be ennobling. Do not begrudge five minutes to trim a dish with green leaves upon the dinner table, not forgetting to twist a spray of flowers or leaves amid the dark or gold of your hair! Somebody's eyes will brighten to see it, and, ere you are aware, you will become "a trap to catch a sunbeam."

Whatever your difficulties, *battle* with circumstances—work good out of ill. Prepare yourselves, if need be, for better homes. Do good, if you expect to receive good. Be faithful to every duty, and gather the sunbeams, which break through the rifts, that you may be prepared to receive the blaze of noon-tide happiness.—Yours truly,

T. S. H.

POSTSCRIPT.

SINCE the previous sheets of the *Country Gentleman's Magazine* were printed, the following alterations which the Premier intends to propose on the Irish Land Bill when in Committee have been tabled:—

Clause 1, page 1, line 10, leave out from "with reference, &c.," to "and" in line 12, both inclusive.

Line 12, after "which," leave out "usage."

Clause 2, page 2, line 20, after "case," insert "and not being in number such as to raise the total of such cottages on the holding to more than one for every twenty-five acres thereof."

Clause 3, page 3, line 1, leave out from "may if, &c.," to "thereupon," in line 3, both inclusive.

Line 4, after "compensation," insert "for the loss sustained by him in quitting his holding."

Line 5, leave out from "regard being had, &c.," to "holding," in line 8, both inclusive.

Line 13, leave out from "£10 and under, &c.," to "reclamation of land," in line 35, both inclusive, and insert—

1. £10 and under, a sum not exceeding seven years' rent ;
2. Above £10 and not exceeding £20, a sum not exceeding six years' rent ;
3. Above £20 and not exceeding £30, a sum not exceeding five years' rent ;
4. Above £30 and not exceeding £40, a sum not exceeding four years' rent ;
5. Above £40 and not exceeding £50, a sum not exceeding three years' rent ;
6. Above £50 and not exceeding £100, a sum not exceeding two years' rent ;
7. Above £100, a sum not exceeding one year's rent ;

Any tenant in a higher class of the scale may, at his option, claim to be compensated on so much only of his rent as will bring him into a lower class.

Clause 3, page 4, line 10, after "case," insert "and not being in number such as to raise the total of such cottages on the holding to more than one for every twenty-five acres thereof."

Line 30, leave out from "the Court in awarding, &c.," to end of clause, both inclusive.

Clause 4, page 4, line 38, leave out from "and is not entitled, &c.," to "Act," in line 39, both inclusive.

Clause 6, page 6, line 42, leave out "and," and insert "or."

Page 7, line 1, leave out "is not entitled, or if entitled, has not obtained compensation."

Page 9, leave out clause 16.

Clause 23, page 14, line 21, leave out "or," and insert "mortgages or other."

Clause 27, page 16, line 4, after "notices," insert "on encumbrancers and other persons interested."

Clause 38, page 20, line 22, insert as a separate paragraph:—

"In framing rules under this section, the Privy Council shall provide that notice of any sale to be made under this part of this Act shall be served upon every registered encumbrancer by sending it through the post in a prepaid letter addressed to such encumbrancer, and in proving service of any such notice it shall be sufficient to prove that such notice was properly directed to the encumbrancer at his last known place of abode, and that it was put as a prepaid letter into the Post-Office."

Clause 44, page 22, line 30, after "sale," insert "under the second part of this Act."

Line 32, leave out "under this Act."

Line 34, after "residue," insert "such sale may be made accordingly under the second part of this Act in the same manner as if the whole of the purchasers of the estate were tenants of the landlord."

Clause 63, page 27, line 31, leave out from "having no greater," &c., to "holding the same," in line 32, both inclusive.

Line 33, leave out "lease or agreement made," and insert "tenancy whatsoever created."

Mr Disraeli has given notice that, in Committee on the Irish Land Bill, he will move to omit the qualification relative to the holding of land for cottages or lands not exceeding half an acre. In the clause relating to compensation, he proposes to reduce the amount of compensation in respect of unexhausted improvements to five, four, two, and one year's value. Another amendment limits the right to compensation for improvements made to twenty years before the making up of the claim, the date at present proposed being the passing of the Bill.

THE COUNTRY GENTLEMAN'S MAGAZINE

MAY 1870

THE IRISH LAND DIFFICULTY—LARGE AND SMALL FARMS.

KNOWING from what may be gathered from the general aspect of small farms on the Continent—an aspect which is altogether unfavourable—we find on examination this aspect is indicated by the rate of wages and the general condition of the labourer on the Continent. This test will not be objected to by those who object to the test of a personal examination of the small farms on the Continent, alluded to in last article; though we maintain that this test of wages, in the hands of a practical man, is a sound one, and tends, if properly made, to sound conclusions of what the system is. Now, as respects the condition and the pay of farm labourers on the Continent, the general assertion may be easily made, that they are far below those of the class in this country. So far below, that no conclusion is inevitable, that the system which brings it about cannot be a good one, but not a paying one. We have said that the condition of the labourers and their pay is below the rates in this country. Take the Belgium districts, and of these the best, is the condition of the labourer there? In words of one authority, “He is content with rye-bread, potatoes, and butter milk. He rarely gets a morsel of bacon or salt meat added to his meagre fare. At home his condition is even worse.” As regards his wages in the same district, they are, with food, only 1s. a-day; without food, 13d., this being an

average. The maximum for men without food, 1s. 8d.; women, 11d.; with food, 9d. for men, and 6d. for women. The minimum for men without food is 11d., and 6d. for women; with food, 4d. for men, and 3d. for women; and we have seen above what the food is. The general condition of the farm labourer, all over the kingdom of Belgium, is thus described in the last Government Report issued—“The condition of the agricultural labourer must be much improved before he enjoys even the moderate degree of comfort to which his toil would entitle him. Often, indeed, his pay would not keep him from starvation were it not for the little strip of ground which he generally cultivates, and so draws some supplemental revenue for the support of himself and his family.” Nor are matters much better in other parts of the Continent. Thus, Mr J. Howard, M.P., tells us that in one district in France the usual rate of wages is two francs in the summer and a franc and a-half in winter, with no extras of any kind whatever. If this district be objected to as being the poorest of the agricultural districts of France, let us turn to the richest, that of Touraine, and what do we find there? According to Mr Howard, the wages are two francs a-day, without any extras whatever, and for this small pay they have to give the large amount of labour involved in a day beginning at four in the morning and ending at eight in the evening:

and the house comfort of the unmarried labourers may be judged from the fact, that many of them sleep with the cattle, a sack of straw being provided for two labourers. Such, Mr Howard says, may be looked upon as by no means exceptional cases in the condition of the French agricultural labourer. The same holds pretty well, also, of the condition of the labourer in Prussia. The wages vary from 1s. 6d. to 1s. 2d. a-day in summer, to 1s. and 1s. 3d. in winter, the working days being four to six hours longer than the day of the labourer in this country. In another district of Prussia, things are even worse, the wages in summer being as low as 10d. and 7½d.; in the winter, 4d.; and in spring, 5d. We have already seen what is the condition of the labourer in Belgium. We may, therefore, conclude with all safety, that the condition of the labourer on the Continent is at a much lower stage than that occupied by the worst paid of our agricultural labourers, and this position of the labourer is a fair index to that of the small farmer; for, as we have already shewn, the cultivation on these farms, and the terms upon which they are held, are such as to preclude all chance of their being able to avail themselves of the appliances of modern science so as to raise their profits; and through the use of which a higher class of labour is demanded, and, in consequence, a higher rate of wage given. We have already given, in the course of these articles, various statements to shew that the small farm system is not that adapted to yield the highest economic results, that, in fact, the contrary is the case; and since giving the statements, a Report has been issued in the last volume of the Royal Agricultural Society of England, on the Agriculture of Belgium, the points in which, bearing upon this question of small farms, go to corroborate fully and explicitly what we have presented to our readers. To that report—which, coming from this authoritative quarter, cannot be objected to as in any sense a non-agricultural one—we refer our readers with all confidence.

Viewing the question of small farms, even under the most favourable aspect, and yield-

ing to no one in our desire to see the man of small means, as well as the farm labourers, placed in circumstances under which they would have a chance of bettering themselves, we, nevertheless, are forced by the evidence before us, that in place of an advance, any system or mode of legislation which would facilitate the increase of small holdings in Ireland, would be a retrogression, and be the means of bringing about, not only a reduction in the productive powers of the land, but a perpetuation of the evils of poverty, which at present afflict small proprietors and cultivators of small farms on long leases, the removal of which is the very object the Legislature is aiming at. And, apart from the question, as to whether the small farm system, *per se*, is one calculated to yield a good living to those who carry it out, we are bound to look at another aspect of the matter, and put to ourselves this question. In those instances where small farmers are successful, as in some parts of the Continent, we freely admit now, as we have as freely admitted before, that they are, in raising the land to the highest degree of productive perfection, if not themselves to the same point of household and personal comfort, are these results obtained by the style of living and of working which are observable in Ireland? We do not hesitate at once to say that they are not. We have already pointedly adverted to this feature of the question, and we maintain, without any fear of being contradicted on this point, by facts we mean, that the habits of the small farmers of Ireland are not those calculated to bring about the results which we meet with in the small farms of the Continent, above alluded to. The hard work, the prudent expenditure and careful saving, the sober life and diligent use of such limited means as are at the disposal of the small farmers of such districts to raise the productive powers of their land, when transferred to Ireland may, likely will, bring about the same results in Ireland, but not till then. May we ask what hope have we that the present generation of Irish farmers on a small scale will

all these economic and social virtues? wrong or unkind in asking this? lly not. We would do them the possible service if, by telling them of ults, we could induce them to mend. They do not hesitate to say unkind, false things of us; is it wise or politic erpetually to be blinding ourselves and o the existence of things amongst hich tends to retard all progress? It is est folly—we use the words advisedly s to be always making it out that it is sgovernment of the Irish that has t about and perpetuates the evils which nong them, as if they had never had ernment of themselves, no habits st them which entirely precluded all of their improvement, social and other- o long as they were in existence. It is ly a shade better, if it is indeed not s bad, to say that those habits arise from t, that they have either no security of for, or are not the proprietors of, the ey cultivate; for an honest and candid into the facts of the case will shew umerous leases are given in Ireland, and e worst cultivated farms are those held e longest leases, and that the farms y peasant proprietors are not the best ted farms—that they are indeed the

Moreover, as we are told always to the Continent, and especially to m, for evidence in favour of the small g system held in perpetuity; let the e known—a fact which many do not and which many who do know studi- eep back, for purposes to which we do present allude—that of the best culti- farms of Flanders, to which attention is n and so pointedly drawn, a large pro- are not held by the proprietors, but e years' leases; so that we do not learn oing to the Continent, to which we are n sent, that the *tenure* of land is that affects the mode and the style of its tion.

conclude our present paper by giving statements bearing upon the point we have discussed in this and a few ing papers. We are indebted to a

correspondent for this, who heads it by the following remarks:—

As much misapprehension exists as to peasant proprietors and their supposed comforts in France, Belgium, and Prussia, and as to rents being less in these countries than here, we give a short statement of each to correct such erroneous views, using Mr Howard's (M.P.) Report on Continental Farming, as well as our own observations:—

RENTS PER ENGLISH ACRE.

Ireland, 15s. to 20s.; *England*, 35s.; *Scotland*, 46s.; *Belgium*, 27s. to 40s.; *France*, 25s. to 30s.; *Prussia*, 25s. to 32s.; *Austria*, 20s. to 26s.

RENTS PER IRISH ACRE.

Ireland, 24s. 6d. to 32s. 6d.; *England*, 56s.; *Scotland*, 74s.; *Belgium*, 44s. to 65s.; *France*, 40s. to 49s.; *Prussia*, 40s. to 51s.; *Austria*, 32s. 6d. to 42s.

LEASES.

Ireland.—All kinds, from 21 to 999 years, and perpetuity lives; numerous sub-landlords and sub-lessees; about half of the area without leases. *England*.—Few, except in the high-farmed counties. *Scotland*.—19 to 21 years, which are general for tillage, and 7 to 9 years for grass. *Belgium*.—3, 6, and in a few instances 9 years; great competition in taking farms from others. *France*.—6, 9, and a few large farms for 18 years. *Prussia*.—6, 9, to 18 years; State lands, for 18 years. *Austria*.—9 to 18 years.

The short tenure and uncertainty of being outbid is a great drawback to Continental farming. Ejectments easier effected than in the United Kingdom. No ill-will or violence offered to incoming tenants.

PEASANT PROPRIETORS, SMALL FARMERS, ETC.

Ireland.—Few, some holding perpetuity leases at 2s. 6d. to 5s. per acre; some small properties bought on sale of large estates; 10,000,000 acres of grazing land, or two-thirds of the whole arable, held in large farms; 142,000 holding an acreage of 13 acres at 8s. per acre, and 175,000 holding $4\frac{1}{2}$ acres at £41 per acre rent; many middle-class farmers. *England*.—Few small proprietors; nearly all bought up by the large, or by capitalists. *Scotland*.—Fewer; farms large, except in west and south-west. *Belgium*.—Mr Howard states there are 250,000 owners or tenants under 2 acres, 20,000 of 30 acres, 10,000 of 100 acres, 1000 of 250 acres—average of all, 11 acres. The State returns of 1856 give a total of 572,550 holdings, 400,514 being from 1 to 5 acres; about half owned by occupier. Over seven-eighths of the area is worked by large farmers or owners. Rents have risen 2 per cent. per annum since 1836. *France*.—Millions of small owners, under Code Napoleon, cultivating half the area of France under 10 acres; they are worse off than farm labourers in Scotland and the farming districts of England. Some large. Best farms in the north. *Prussia*.—900,000 owners under 4 acres; some large farmers; many owners work their own estates. *Austria*.—Numerous peasant owners from

15 (smallest) to 60 (largest size) acres; some large farms held by tenants or owners.

There are few middle-class farmers like the Scotch or English on the Continent. Most of the holdings are from 2 to 20 acres.

WAGES.

Ireland.—In summer, 1s. to 1s. 4d.; in winter, 10d. to 1s.; formerly, 6d., 9d., to 1s.—wretched hovels. *England*.—2s. to 2s. 6d.—good cottages. *Scotland*; —2s. 6d. to 3s. *Belgium*.—8½d. to 1s. 8d.. average, 1s. 1d.—work very long hours; ill housed. *France*.—1s. 2d. to 1s. 8d.; average, 1s. 4d.—working sixteen hours, and until two o'clock on Sundays; ill housed. *Prussia*.—1s. to 1s. 3d.; in Silesia, 6d. to 10d.—ill housed. *Austria*.—9d. to 10d.—ill housed.

INTEREST ON MORTGAGES.

Ireland, 4 to 6 per cent.; *England and Scotland*, 4 to 5 per cent.; *Belgium*, 10 per cent.; *France*, 10 per cent.; *Prussia*, 10 per cent.; *Austria*, 10 per cent.

INTEREST ON BANKS.

Ireland, 6 to 7 per cent.; *England and Scotland*, 4 to 5 per cent.; *Belgium*, *France*, and *Prussia*, none for farmers—money borrowed at usurious Land Bank rates; *Austria*, none.

STATE LOANS.

Ireland, *England*, and *Scotland*, repayable, principal and interest, in twenty-two years at 6½ per cent., or thirty-five years at 5 per cent.; *Belgium*, none; *France*, none; *Prussia*, none; *Austria*, none.

VALUE PER ACRE.

Ireland, £30 to £45; *England and Scotland*, £50 to £100; *Belgium*, £50 to £85; *France*, £40 to £60; *Prussia*, £40 to £60.

VALUE PER ACRE (TENANT-RIGHT).

Ireland (Ulster), £10 to £15; *England and Scotland*, none; *Belgium*, none; *France*, none; *Prussia*, none; *Austria*, none.

AVERAGE PRODUCE OF WHEAT IN BUSHELS PER ACRE.

Ireland, 26 bushels; high farming, 30 to 40 bushels. *England and Scotland*, 28 bushels; high farming, 44 bushels. *Belgium*, 21 bushels. *France*, 14 bushels. *Prussia*, 17 bushels; in Silesia, 10 bushels. *Austria*, 15 to 16 bushels.

In Italy, Spain, and Portugal, leases are only for three, five, and seven years for small farms; rents, one-half or one-third the produce, generally paid in kind or money. *One acre in England and Scotland produces treble the meat and treble the grain of the Continent, owing to the small holdings and the number of peasant proprietors there.* In ten counties in England, between 1851 and 1861, 4016 farms, 100 acres and under, were absorbed by larger ones, and many between 100 and 200 acres; no returns from the other counties. Lands are highest let in Scotland, Belgium, and England, and lowest in Ireland. Labourers are worst off where there are small peasant proprietors, as they compete with them.

CAPITAL IN AGRICULTURE—CAUSES DISCOURAGING ITS APPLICATION.

AT A Meeting of the Newbury Farmers' Society, held last week, Mr Mechi read the following paper on the "Causes Discouraging the Application of Capital to Agriculture."

A nation, he commenced, superabounding in population and in wealth, which it loans to foreign nations in hundreds of millions, and yet, with its land half farmed and half capitalised, is dependent on foreign countries for nearly one-half of its daily bread, must appear to every reasoning mind, a pitiable, dangerous, and reproachful anomaly.

There must be causes for this uncomfortable state of things, and into those causes we are about this evening to inquire. When

this subject was proposed to me, I asked of myself the following questions:—

1. Are there practicable remedies?
2. Will they benefit alike landowners, tenants, labourers, and the country at large?
3. Can the necessary capital be found to carry them out?

And I at once, guided by my own long practical experience as landowner and tenant, answered in the affirmative. As to capital, we are all, I believe, agreed that almost any amount of money may be had on land security; and that is, I know, the experience of the several Land Drainage and Land Improvement Companies that have been of late

established. I therefore anticipate that a security on the land for the cost of improvements effected by these companies hereafter looked upon as a commendable desirable transaction.

time will come when purchasers of will naturally expect to find a considerable annual charge on them for liquidation principal and interest of improvements effected through these companies. This will (when legalized on entailed and leased estates) bring into agricultural profit the surplus funds of those who, these companies, would never have thought of investing their money in agricultural improvements. It will divert millions from loans that would go to strengthen foreign trade as our agricultural and manufacturing competitors, and would bring vast funds for agricultural use and profit. Before I continue my subject, let me say, truthfully and without flattery, that your county is one in the forefront of agricultural progress, thanks in great degree to that wise, good, and far-seeing noble late much lamented Prince Consort, the late Mr Pusey, and to other spirited gentlemen and their tenants—some, alas! deceased.

But, from your invitation to me, and on the subject which you have chosen, that I am dissatisfied with the present condition of British agriculture, and desire to see it improved, so that we may be enabled, now that we have free trade in corn and meat, to compete successfully with foreign nations in the production of human food.

I therefore ask myself, Could we thus successfully compete?—and I reply, with confidence resulting from long practical experience, that we certainly could so compete, provided that all the conditions were favourable—the investment of more capital and increase in agricultural production. But the important and significant is this last one! It may be said to contain the future of British agricultural progress. In order to succeed fully, British agriculture should be, both as regards landowner and tenant, as free as air, and released from numerous trammels which at present

cramp its action and hinders its advance. I presume we are all agreed that so long as the average prices of meat and grain are remunerative, we, as farmers, shall not complain, although those prices may be subject to the ups and downs that have ever attended and ever must attend agricultural productions. But while the average prices since the introduction of free trade have been satisfactory to those whose farms are in proper condition, favourable to capital, thousands of farmers who are deprived of those favourable conditions have had, and continue to have, especially just now, a painful struggle, and are totally unprepared to combat successfully with foreign competitors at the present low prices. Shut up in little ill-shaped fields, with broad hedgerows and timber trees, their land undrained, their roads wretched, their homestead ill-placed, their personal and animal accommodation insufficient and ill-arranged, their leases restrictive and antiquated, and, in some cases, ground game in excess, and a deficient capital, theirs, indeed, must be a sorrowful and unprofitable lot; still further aggravated by the uncertainty of annual tenure, and the absence of a valuation for unexhausted improvements. Not only have they to compete with foreigners, but also with those of their own countrymen who, in every one of these respects, may be much more favourably situated than themselves.

When I say that we could compete successfully with foreigners, it is because I know that we have an important natural advantage over them (from our greater proximity to a market) which, I think, may be taken as approaching 15s. per qr. on wheat.

A considerable difference of opinion prevails as to the cost to foreigners of placing their grain in our markets, and that is not to be wondered at; see not only how variable at times are the charges for conveyance by land or water, but also how different are our distances from the sources of supply. Estimates run from 8s. to 20s. per qr.; probably 15s. would not be far from the average truth. A friend, well versed in the foreign corn trade, writes to me thus:—"As you put the question, 'Has the British farmer a protection

to the extent of 15s. a qr. in wheat?'—coming from the Western States of America, and the interior of the south of Russia, perhaps you would be within the mark, but the great bulk of our supplies come not thence direct, although I have little doubt they do by displacement. A large portion of the wheat shipped at St Petersburg ascends the Volga, nearly 2000 miles, and is two years reaching the port of shipment! What are the charges, waste, and interest of money? A Russian gentleman informs me that this tedious transit has been considerably hastened by the use of steam-tugs on the Volga. The absence of local roads and bridges in Russia and other countries that supply us with grain, render its conveyance difficult and costly. They are, however, making railways with English money."

We must not forget, in making our estimate, how numerous and repeated are the charges on transit, such as loading and unloading by land and water, cartage, freight, insurance, commission, difference in weight, waste, damage by damp, heating, or salt water, the latter not recoverable by insurance unless from some accident to the ship.

Now, as a good British farmer will average 5 qrs. of wheat per acre (some years I have averaged 7 qrs. per acre), he has thus an advantage, from natural causes, of £3, 15s. per acre, to which must be added the difference in acreable produce, which is certainly from 1 to 2 qrs. per acre. The returns for the quantity of seed wheat sown are—In Southern Russia, 5 for 1; in poor northern land in Russia, 4 for 1; in England, 14 for 1; with good farmers, 25 for 1; on my farm, 40 for 1. In the United States of America it can be scarcely 6 for 1, because their average crops of wheat are, I have reason to believe, as low as 16 bushels per acre. Ours in England are 28 to 30. In Russia, America, and other foreign countries, the hand and horse-hoe are too generally neglected, and consequently they get a mixed crop of weeds, seeds, and grain. I am sorry to say that some farmers do this, even in England.

Against our advantages, which I have de-

scribed, must be set off cheap or nominally rented land, and the generally smaller cost of production. Take the extreme cases in favour of the foreigner:—

Our rent, rates, tithes, and taxes . . .	£2 0 0
Cheaper labour in Russia	0 10 0
Other charges, manures, &c.	1 0 0
	£3 10 0

—that would still leave a balance in favour of England.

In America, whence we derive so much of our wheat, labour is double the price of ours, so that our advantage is increased to that extent. It may be useful to consider the present aspect of the foreign grain trade as it affects the foreign farmer, for he is by no means just now in a comfortable position, and if I am not mistaken, these low prices will soon lessen foreign import, and gradually enhance prices here.

Wheat has recently been bought at Chicago (United States) at 20s. per qr. and in Russia at the same price. That wheat cannot be brought here and sold with any profit much under 40s. per qr., but how much does the farmer get for it, who lives hundreds of miles away from a shipping port?—for we must remember that most of the lands of the old settlements near seaports have been long since exhausted by constant croppings, and that it is only from the distant interior that supplies can be now obtained. Even with our good roads, which are wanting abroad, we cannot convey wheat to market under 2d. per qr. per mile, or 16s. 8d. per 100 miles. I know of oats contracted for, free on board at Montreal, in Canada, in May next, at 12s. 3d. per qr. How much will the poor farmer get, who is some hundreds of miles distant from the shipping port? A Canadian gentleman assures me that after deducting from the present price paid in London, the charges in London, ocean freight, the transport from Chicago to New York (the port of shipment), and the charges at Chicago, with cost of land transport to Chicago, the grower realizes only 13s. 6d. per qr. for wheat, or very little more than half the cost of production. He anticipates that sup-

us must greatly fall off. I am assured porters and importers of grain have, the last six months, suffered a loss of £2,000,000 sterling, having ordered wheat too dear, expecting, as many of us that corn would realize a high price. The high price of labour in America is sufficiently proved by the fact, that last year the mowing and reaping machines were

asking pardon for this digression, I now proceed to name the obstructions to agricultural progress.

Want of security of tenure by transferable leases.
Want of legalized sanction of valuation for tenants' unexhausted improvements.
Want of a more uniform practice in valuations, all other things being equal.
Want of law of entail.
Want of cost, delay, and difficulty of land transfer.
Want of drainage, local and arterial.
All irregular fields, with too much hedgerow, timber, and ground game.
Unsuitable residential and animal accommodation, misplaced homesteads, and ill-shaped farms.
Want of retention of half the kingdom (22,400,000 acres) in permanent pasture, much of it robbed, starved, poor, and unimproved.
Want of education.
Dislike to change, and a comfortable belief in antiquated customs.

SECURITY OF TENURE

One of the most important means for increasing capital. Human nature is alike in town and country. Who, in a town would not make an improvement with merely annual lease, or unsecured by a lease, with power of transfer that lease? Without leases, London and other great cities would have remained small and antiquated. The nineteenth century lease, and the intelligent education of the tenant farmer and his labourers, have, together, worked well, especially for the landowner; and only require the valuation of the tenant's unexhausted improvements to make the system nearly perfect. Mr Gladstone, in his speech on the Irish Land Question, said that in England tenures were more numerous than in Ireland. By courtesy they are, not by law or contract. In order to satisfy myself on this point, I made inquiries of

several of our most eminent landvaluers, whose replies, so kindly given, are as follows:—

1. "I do not know how to answer your question, there being no data upon which to base an opinion. In the Home and Eastern Counties I should say leases were general; in the Midland and Northern Counties the exception. You may take this fact, however, as indisputable, that by far the larger majority of tenants would accept leases if they had the chance."

2. "I cannot give you from any data the extent of land under lease in England, but I do not think it can exceed one-tenth of the cultivated portion. I am very doubtful, indeed, whether the majority of farm tenants would have leases if they were offered; but this is owing to the present want of capital that is wanted, and leases would be a *sine qua non*."

3. "There are no means of arriving at any, even approximate conclusion as to the proportion of leasehold to annual tenure. The difficulty in England is to get the tenant to accept a lease."

4. "I consider that four-fifths of the land in England are held on annual tenure, and the remaining fifth held under all sorts of leases, some for the term of seven years, and again for the term of twelve, fourteen, and twenty-one years. I very recently gave the tenants of a large estate in Lancashire, for which I am agent, the option of holding on as yearly tenants, or of accepting leases at 3s. per acre more rent than they were asked to pay as yearly tenants: all the tenants accepted the leases at the additional rent."

It is quite true that on certain noble estates, where it is made a point of honour never to change the tenantry against their will, tenants do not wish for a lease, and would decline taking one. The true reason is, that they know that they hold at an unvarying or easy rent rate, with fixity of tenure, and they also know that under leases landowners obtain higher rents than without them; for while now all is quiet and undisturbed in the tenant's case, had they leases there might and probably would arise at the termination of those leases, revaluations or other reconsiderations. "But,"

said I to a tenant of 1000 acres on such a well farmed noble estate, "supposing that an unjust or oppressive landlord should succeed to the estate?" "Oh," said he, "a few instances of wrong-doing would alarm the tenantry; they would change their high farming for a taking-out system, and the estate would soon become deteriorated in value." Again, he said, "The stewards of the estate are well aware of this; so we see no danger of such a kind." They justly observe that the Scotch nineteen years' lease (without valuation of tenants' unexhausted improvements) has enormously increased rents, to the landowners' great advantage; and they thus appreciate their own more favourable position.

Notwithstanding these facts, I am still decidedly of opinion that farming should be treated as a business, and not as a favour, and that leases, with a valuation of tenants' unexhausted improvements, would attract a greater investment of capital, and improve the class of tenants.

THE LAWS OF ENTAIL.

One-half of England is owned by 150 individuals, and one-half of Scotland by about twelve. In most of these cases the owners are merely tenants for life, fettered by very limited powers, quite inconsistent with agricultural improvement. Some relaxation has been granted by Parliament, but much more is required. I am glad to see that the succession question will be considered by the Government.

VALUATION OF TENANTS' UNEXHAUSTED IMPROVEMENTS.

No doubt we shall have for England a legalization of tenants' unexhausted improvements, and a general but clear definition of them. We know that we have a body of able men as land valuers and land agents, forming a society called the Surveyors' Association. I hope that they will soon come to an agreement as to the most important questions, such as drainage of stiff clays, covered yards, fixed steam machinery, &c. We want uniformity of valuation, other things being equal. Now, I can find valuers and farmers in Essex who don't believe in the deep pipe drainage

of stiff tile clays, although they would decline to stop the holes in their flower-pots. I look upon stiff soil deep pipe drainage as almost a permanent improvement, provided the outlets are kept free. Mine, done twenty-five years ago, are all perfect, and likely to remain so for another century. In light and springy soils the drains require more attention.

Covered and enclosed yards, with paved floors, I look upon as essential to the successful farming of stiff soils. It is a great mistake to suppose that such farms are not stock farms; they will produce stock food abundantly, and with proper management and suitable winter shelter, plenty of stock may be reared and fattened, as I know by experience.

Modern agriculture, with its chemical and mechanical aids, and artificial foods and manures, has become quite a different affair from the primitive pastoral period of the past century, and requires, in respect of tenure, concurrent and suitable conditions and valuations, giving confidence and support to the extra capital that must be now invested. The incongruous and inconsistent state of our valuations for tenants' improvements or investments is, as a system, or rather as a want of system, discreditable to us as men of business. In one county, every improvement is by custom allowed for; in another, not one is taken account of. A farmer in Essex may have expended £10 an acre in the draining and chalking of stiff clays, yet not one farthing would be received by his family should he die, and the farm be let the very next year after the execution of these costly investments.

THE WANT OF GOOD FARM ROADS.

In this age of locomotive steam-ploughing engines, weighing from 6 to 25 tons, a farm can hardly be said to be in fit condition for capital until it has good internal roads. I know of more than one valuable engine stuck fast in the mud, and waiting for a dry time.

AGRICULTURAL RESIDENCES.

Landowners often complain to me of the difficulty of finding tenants with capital to take their farms, forgetting that modern agriculture, with its greatly increased capital, is

and to suitable conditions, very different from the antiquated arrangements of too many of our south country farmeries. Men continually seeking for farms often say to me, "I could take that land, but the house and the tenants are wretched, the land undrained, the whole affair unsuitable for the profitable investment of capital." If a tenant is to have a capital of £15 to £25 per acre, which I recommend on arable land, and this is often the case in Norfolk and Lincolnshire, he must be treated as a gentleman, and not to be the practice on some of our estates, where the tenants and their families rank high in comparison with the wretched districts. That is the way to improve the landowner's rental and to feed the people. Modern farmers with education and capital do not wear smock-frocks and dine in the kitchen with their labourers, as was once, and now in some districts, the custom.

2. OR NEGLECTED PERMANENT PASTURE
This is a great barrier to the investment of capital, the employment of labour, and the production of food for the people; 22,500,000 acres being one-half of our available land, and permanent pasture, much of it poor, old, and unimproved, yielding a wretched produce of probably only 45s. per acre. For cultivation, with modern improvements, is an exactly opposite state of things and prevail. It is a mistake to suppose that arable land cannot be made stock

TREES AND HEDGEROWS

succumb to steam cultivation and to improvement. I wish that our Board of Agriculture would give us a return of the miles of hedgerows, their average length per acre, the number of trees, and their numbers per acre. The length of open ditches and water-courses would be also desirable.

GAME.

The exclusive privilege of sporting would, in many cases, attract tenants of capital. The hunted gamekeeper, and too much the dog game, often repel capital.

EDUCATION.

The want of it, either for our farmers or their labourers, must be a great impediment to successful agriculture. Scotch farmers and their labourers owe much to their long-established and general education, dating from the time of John Knox—300 years ago. In this respect they have stolen a long march upon us south countrymen; hence the general prevalence of Scotch valuers, stewards, gardeners, and bailiffs in England and Ireland. England is, however, at length awakening to the importance of education, and I rejoice to see that the matter is taken in hand by our Legislature. I have been told, more than once, by large practical farmers of the old school, that not only was education not required, but that it would spoil their best labourers. Let us hope that this delusion is gradually passing away. What we require in our agricultural labourers and in ourselves is intelligence; and although it is only the Almighty who can give natural talents, man may cultivate and improve them. Certainly the ability to read, write, and cypher, would afford to the labourer, desirous for information and improvement, the means of acquiring both, and thus of becoming a more useful member of society. Ignorance is not bliss, even in agriculture, but knowledge is power.

Not only will education render the labourer much more valuable to his employer, but it will also enable him, if he has talent and a desire for improvement, to emancipate himself from the mere drudgery of labour, and take a better position in society. Several of my best labourers, aged about 45, who have been with me more than twenty-five years, can neither read nor write, and they all regret it, especially the one who has managed my steam-engine and machinery for the last twenty years, and who could greatly improve his natural talent if able to read the current engineering literature.

The superior intelligence and rapidly increasing power of our American cousins arises from their passionate love of education; their Government and people have always made ample provision for national education by endowment with lands and by liberal taxation. It

has been a paying investment, and but for their vast area of cheap land, and the consequently high wages of labour, we should have lost ground in the competitive race of manufactures, and perhaps warfare. There are more than 120,000 public schools and colleges in the United States, most of them free. Education would also, no doubt, effect a religious and moral change in our labourers, and much diminish the difficulties of the beer-shop question. At present the uneducated labourer's mind is comparatively a blank, receiving no impressions from past or passing events, British or foreign; but educate him, and he, like ourselves, would take a lively interest in the world's affairs. The broadsheets of intelligence in newspapers and books would then give him wholesome excitement, and occupy pleasingly, innocently, and profitably, much of that portion of his time which is now injuriously wasted at the beer-shop. We have already a halfpenny newspaper in Essex, and I hope that the postal charges on them will be greatly diminished. Everybody in America reads a newspaper; there, newspapers were produced at a cheap rate long before we attempted it.

NECESSITY OF EMPLOYING ADDITIONAL CAPITAL.

We must, both landlords and tenants, expect and prepare for great changes in our agricultural practice. Local and arterial drainage, the utilization of town sewage, the manufacture of beet-root sugar, or its distillation for spirits, the extensive use of steam for cultivation, and fixed steam machinery, covered homesteads, &c., will necessitate a considerable relaxation in the stringency of leases, and require large additional investments of landowners' and tenants' capital. General and needful agricultural improvements, both by landowners and tenants, might gradually absorb much more than £500,000,000 of additional capital; it would be a safe and profitable investment. This is no exaggeration; I speak practically on the matter. We have nearly 50,000,000 of available acres, besides uncultivated wastes. The mere drainage of the portion requiring it would, according to our best authorities, absorb

more than £100,000,000, to say nothing of many other costly landowners' improvements. The tenants' capital increased by £4 per acre would absorb an additional £200,000,000.

On my farm, and on many others, the acreable sums expended by landowner and tenant are very much beyond the amounts I have specified. There need be no fear of our arriving too suddenly at the expenditure I have named: a host of prejudices bar the way—let us try and remove them. The multiplication of our population, now numbering 32,000,000 (which seventy years ago were only 10,000,000), will outstrip, I fear, any attempts we may make to provide them with home-grown food.

What a happy country this would be if, by the freedom of agricultural action and by the investment of ample additional capital and intelligence, we could produce our own food as we manufacture our own clothing and other necessities, and in the act of so doing employ more of the British people, thus diminishing suffering and pauperism, and increasing the wealth, strength, and content of our country. Experience has taught me that all this could be profitably done, and I pray that those who have the power may be moved to encourage, by suitable and improved legislation, and by every other means, so desirable a result.

MANURE.

You will agree with me that the quantity of food we can produce must depend upon the quantity and quality of the manure which we deposit in the soil. Admitting this to be so, our country ought to be one of the most productive in the world, for not only do we consume all that we grow, but, in addition, some £70,000,000 worth (solid and liquid) of human food which we import from foreign nations, in addition to millions' worth of food for our live stock. The results of all this, which now pollute our streams, would, if applied to the soil, produce food enough without foreign imports, and spare our paying £2,000,000 annually for birds' dung from Peru, and taxing the graveyards of the world for osseous remains.

But if we have not yet made the land fat

by sewage, we have evidently succeeded in fattening the bed of the Thames by pouring into it for many years the results of all the good things that we consume. There can be no mistake about this, for a French gentleman has succeeded in extracting fat from Thames mud, and it is reported that he has established a factory at Battersea for that purpose. A series of chemical analyses have shewn that there is an ample supply of fat on all the mud banks, both on the north and south side, of our once salmon stream. Can there be a more bitter satire than this on our national agricultural intelligence? Need we be surprised at this, seeing how many tons of fat pass daily into our river?

In conclusion, this is an unfavourable time

for arable land farmers, and many will suffer heavy losses. My balance-sheet for 1869 shews a considerable decline from those of former years, as you will see at foot. The difference would have been greater, but that I sold much of my corn before the heavy fall in price!—

*Balance to pay Rent, also Interest and Profit on
Tenant's Capital on 170 Acres.*

1869	£427 13 6
1868	572 13 6
*1867	773 5 10
1866	573 11 6
1865	543 7 4

Let us, then, resolve to amend our agricultural ways, for our own profit, and for the good of our country.

EARL WARWICK AND GAME.

FROM a stable, it is said by people who are betting upon the turf, one gets good "tips." Sometimes the information from that quarter is not quite so reliable as the gentlemen who make it "a moral certainty" (whatever that may mean) imagine, and *lose* by. From a stable-yard—to be precise, "No. 1 Stable-Yard, St James'," has been published a letter which appears to us to give a very good "tip" (we are keeping up the sporting phraseology), to farmers about the Game-laws. The communication is from the Earl of Warwick, to the Warwickshire Chamber of Agriculture. The Earl does not assume that high-handed style towards the occupiers of his lands that his ancestor did towards crowned heads; nor do we think, from the tone of his document, that he will ever attempt to make and unmake tenants in the same arbitrary fashion, as in former days Warwick made and unmade kings. Far from it. His tone is fair, except about the *battue*, and his remarks, therefore, worthy of consideration and respect. He approaches that fertile subject of dissension, the Game-laws, in a frank and calm manner, such as becometh all who really

wish the subject amicably settled between landlord and tenant. We cannot think that all thoroughly interested will be well pleased until such time as the Game-laws are wholly abrogated, and a tax imposed upon the weapon which destroys the creatures legislated about.

Meanwhile "let us reason together" about Earl Warwick's temperate letter with regard to his absence from recent debates in the Warwickshire Chamber of Agriculture. The avowed object of most Chambers of Agriculture on their organization was to promote harmony between landlords and tenants, and so working agreeably together, advance the great cause by which both live—agriculture. The idea of the value of Chambers, originated, we think we are safe in saying, with the occupiers, but they were not blind to the fact that the membership of proprietors would be of very great advantage in establishing good relationships between each party. With this view landlords were invited to join, and a large number cordially accepted the invitation. As a rule, it was never thought that the Chambers were calculated to occasion a feud between lessors and lessees. On the con-

trary, as indicated above, the very reverse was the fact. Co-operation, *not* antagonism, between classes, was what was desired. It was thought that if it could be so arranged that landlord and tenant could meet each other upon the broad "platform" of an interest that was mutual, that much of the heart-burning, the ill-feeling, which existed would be for ever done away with—that men would recognise that the owner of the soil was not so selfish, nor the tenant so disaffected, as popular rumour represented. It was believed that, upon acquaintanceship, many of the petty but irritating grievances between the classes would be speedily redressed—that at no distant date the acquaintanceship would ripen into friendship, that both would work for the common good; and that

"The war-drum should throb no longer, but the battle-flags be furl'd,
In the Parliament of Man, the Federation of the world.
Where the common sense of most should hold a freeful realm in awe,
And the kindly earth should slumber, lapt in universal law."

(The Poet Laureate will forgive us for altering the tense). Unfortunately quite the opposite has proved to be the case in many instances. The Chambers have brought down the tomahawk instead of producing the calumet; and scalping, instead of friendly smoking and chatting, has been far too common among landlords and their tenantry. The consequence of these recriminations have been that several have withdrawn their names as members from some of the Chambers, while many more have declined to join them at all. It is with reference to this bitter feeling which has arisen in these associations, and more particularly in relation to game, that the Earl of Warwick writes to the Secretary of the Warwickshire Chamber. After deploring the spirit of animosity displayed towards the landlords as a class at some recent meetings, which had prevented him from attending the same, his Lordship remarks, with reference to game, that without going so far as to say it is not a legitimate subject for discussion by a Chamber of Agriculture, he is of opinion that, considering how liable it must be to produce

antagonism of classes, it should only be entered upon in a moderate and kindly spirit. Now, while we have no doubt whatever that the discussion of the Game-laws is one that falls very legitimately within the province of Chambers of Agriculture, yet we agree with the Earl of Warwick that it is highly desirable that the consideration of the question should be entered upon by both sides "in a moderate and kindly spirit." Unless there is forbearance in feeling and expression on the part of both classes, acrimony instead of advantage must result from the discussion—injury instead of prosperity to agriculture.

According to the Earl of Warwick, the opposition to the present state of game assumes many forms, which he thus divides:—1. From those who suffer from injury done to their crops by excessive preservation. 2. From those who wish farmers to be their own game preservers. 3. From those who wish to see game utterly destroyed. And 4. From those who only use the cry of injury by game as *capital* "to break down the position of landlord and tenant throughout the country." With the first, Lord Warwick professes his hearty sympathy, remarking, that he "cannot conceive any reasonable landlord who, if the matter were represented to him in a really kindly and friendly spirit, would not endeavour to meet his tenant halfway" in such circumstances. With regard to the second, he does not agree that the property in game should be transferred from the landlord to the tenant, and that the landlord should be permitted to shoot the wild creatures on his estates on sufferance only. His lordship does not appear to be aware that the law in England, at present, gives the tenant the right to the game, and not the landlord, who obtains the exclusive privilege to kill the game only by a direct stipulation to that effect in the tenant's lease. Few people sympathize in the total destruction of game, and of course it was not to be expected that Earl Warwick would. Subjection and extirpation are two different things, and the former, and not the latter condition, is that which all moderate men desire to see game reduced to in this country. For the fourth set of oppositionists, who use this cry of game

merely for the purpose of arousing the jealousies of class and class, no right thinking man can have any other than a feeling of loathing, for in the words of Earl Warwick on this head, "nothing is more foolish and wicked than antagonism of classes, and they incur a heavy responsibility who are reckless enough to encourage it, and hope to take advantage for other purposes, of the evil spirit which it engenders."

After such remarks, as we have summarized above, we are rather astonished to find Lord Warwick defending the *battue*, although it is in a somewhat half-hearted way, and still more the grounds upon which he makes his defence of this most unsportsman-like practice. He himself prefers moderate shooting throughout the season to one or two field-days of butchery, but he implies that this cannot be got now, mainly owing to improved farming!

"Formerly numerous small plantations existed on a farm, and every hedgerow and stubble field was a cover for game; but the close cutting of these has forced high feeding, as game can only now be kept together in compact masses, and if disturbed more than once or twice in the year, is driven over a country where there is no cover, and lost. It therefore becomes necessary, when once disturbed, to kill it. The same thing applies to partridges. I infinitely prefer walking with a good dog, and seeing him work, but this, for a similar cause, is now impossible, and hence the necessity of *driving*."

We cannot coincide with his lordship that game in the country is so scarce that it is necessary, if one would have any for the table, to gather them in as a poulterer does chickens from their farmeries; for if such scarcity, why the great outcry about over game preservation? And surely Lord Warwick

does not mean us to infer that he would prefer on his estates partridges to peasants; small fields and plantations, and badly drained and cultivated lands to large, squared-off, finely tilled enclosures, in order that he might shoot with a friend or two throughout the season. If he really means this, and such inference from his defence of the *battue* seems almost allowable, then his position on this point is rather analogous to one assumed by another of his order years ago, when he exclaimed,

"Let laws and learning, arts and commerce die,
But give us still our old nobility."

At the end of his letter the Earl of Warwick thus defines his position in relation to game—

"I have no wish to see a *rabbit* on my lands, neither do I desire an overstock of hares, and if (as will sometimes happen) they inadvertently get a-head, I will do my best to control them. Further than this, I should be willing, in extreme cases, which I trust would not often arise, to have the damage valued by a friend on either side. I am far from saying that there are no instances of hardship, which I much regret; but I believe that, as a general rule, if tenants will not shew distrust of their landlords, and the landlords on the other hand dismiss all selfish feeling, and sacrifice *excess* of game preserving to the benefit of their tenants, these unpleasant feelings (unless otherwise fostered) will soon subside, and a better understanding be come to without the aid of legislation."

This is seemingly fair, but we do not think that such ideas will be harmoniously carried out by both sides without some legislative guarantee; and the difficulties, which grow with the discussion of the question, of securing a satisfactory measure induce us to advocate instead a Tax on Guns.

REPEAL OF THE MALT-TAX.

SOME time ago we expressed our doubts whether "the rather unimpressible Mr Lowe" would be able to see with the same eyes of the deputation who waited upon him to shew the necessity of abolishing the duty upon malt; and it was almost as we thought. Mr Lowe we recognise as one of the most courteous and sagacious gentlemen who has held the financial strings, recognising, at the same time, the great merits of those who, on both sides, have gone before: one, Mr Lowe's political chief, and the other, the most distinguished oppositionist of the latter. And in saying this, we say it in no political bias whatever; for with party politics, as a purely independent journal, we have nothing at all to do. Our only endeavour is to do the right and just thing, so far as in us lies, towards all parties, Radical, Whig, or Tory, and we have good reason to believe that our constituents are made up of all. Agriculture was an institution long before party politics were known, and it is not unlikely that it will continue to exist long after what are now known as politics—which often mean dissension—are buried in oblivion.

But, it may be asked, what has all this got to do with the Malt-tax? Stop a moment. Most of our readers will probably have heard of a poem by the Poet-Laureate (whose works, by the way, have *now* become so famous that he has found it necessary to issue an interdict in the Scotch Court of Session against pirated editions from America), running in this way:—

O plump head waiter at the Cock!
To which I most resort,
How goes the time? 'tis five o'clock;
Go fetch a pint of port.

Clearly, or at least seemingly, indicating that the Laureate cared nothing about that most valuable home-grown cereal, barley. We have often been in the "Cock" (blessed

be its memory—it is gone now), opposite the Temple, to which the denizens of that famous abode did resort every day, and their rule was not port, but *porter* or beer, all, or nearly all "sticking up" for the beverage the produce of which was grown upon our native soil, and upon which the Chancellor of the Exchequer says he levies so large and so easily collected a tax. Off wines, if we can remember rightly, a considerable duty was taken, principally through the instrumentality of the head of the present Cabinet. No vines are grown in this country, and therefore all the advantage of the cheap, and it would not be too much to say the nasty, wines, that we are occasionally obliged to drink, goes into the pocket of foreigners, at the same time that our own wholesomer commodities are heavily taxed, even before they are manufactured into liquor.

Mr Lowe, so far as we can make out, has practically admitted the unjustness of the assessment, but clings to its continued imposition, on the ground that the funds are necessary, and easy of lifting. It is still to be learned by Englishmen, that any tax which is unjust—which not only manifestly interferes with the poor man getting a glass of good beer (and, as he will have drink, so forcing him to take bad at a high price), but likewise prevents farmers from raising up for the community at large beef and mutton at less cost than they now can—should be tolerated, however much or little its amount. And if the injustice be much longer persisted in, it may come about that the ease of collection will not be so luxurious as at present. Less grievances than the Malt-tax unredressed have in bygone days given the tax-gatherers a great deal of trouble. It is perfectly absurd in the Chancellor of the Exchequer to say—the hardship of the impost being admitted—that he cannot do without the money which it yields. He can levy excise duty upon something else, under the class of

luxuries, rather than upon beef or mutton and beer, which cannot be regarded as coming under this head. We shall endeavour to point out in another article how an increase to the revenue less of a class character than the Malt-tax can be effected.

No doubt it will be said that the tendency of recent legislation has been to take off duty, not to lay it on, and that it would be retrograding to re-impose any tax previously abolished. But, then, were all the duties which have been remitted in recent years sacrificed judiciously? Were they pressing so heavily upon the community as to be like the proverbial last straw which breaks the back of the patient camel, and must therefore at all hazards be removed; or were they so trifling that they were scarcely worth collecting? To the first question we must decidedly answer No; to the second, that, although trifling in amount, the ceasing to collect some of the duties at all, although a boon to the foreigner, was the cause of great depression too one or two of the industries of this country.

It must not be understood from what we have said that we desire a return to Protection. Far from it. All we claim is, that the measure of Free Trade so liberally accorded to

our Continental neighbours should be meted out in like manner to ourselves. It matters not whether the amount raised is small or great whether fifteen or fifty millions of taxation depended for readjustment upon the repeal of any tax that presses most unduly upon the energy and the skill of a class, and is hurtful also to the interests of the population generally, as the Malt-tax does and is, such tax ought to be repealed, or at the very least mitigated. One can hardly tell from Mr Lowe's reply to the deputation whether he intends to reduce the Malt-duty or not. It is certain he is not going to abolish it, but he has left the impression upon some minds that some amelioration will take place. We are not very hopeful; Mr Lowe's manner to the deputation reminding us much of that other official of whom it is written—

“The Chancellor, sedate and vain,
In courteous words returned reply;
But dallied with his golden chain,
And, smiling, put the question by.”

We shall see, however, when the Budget comes. If the thin edge of the wedge is once got in, farmers will have themselves to blame if they cannot muster force enough to drive it home.

THE POLLUTION OF RIVERS.

[Continued from page 266.]

REMEDIES PROPOSED BY THE COMMISSIONERS IN THE CASE OF SEWAGE.

BEFORE we enter upon this discussion, it may be as well to recapitulate what the evils are against which it is sought to provide a remedy.

They are, first, the presence of solid refuse in the channels of rivers and streams, including cinders, ashes, spent dye woods, and the sweepings from streets and roads.

Second, the pollution of the water of these rivers and streams by the introduction of sewage, especially of that which forms the most offensive portion of sewage, namely, human excrements.

Third, the pollution of water by liquid manufacturing refuse; of which, under various heads, an account has already been given.

These are all evils arising out of the use or abuse of the streams, or of the water passing down them. A difficulty much less amenable to remedies has indeed forced itself upon our notice in the course of our inquiries, namely, the scanty amount of the supply of water for the wants of the population. We will, however, first consider the methods calculated to remove the evils stated above, leaving the question of water supply to be discussed in the sequel.

The first matter complained of is the presence of a large bulk of solid refuse in the channels of the rivers and streams. When we consider the enormous amount of coal consumed, and remember that for every 8000 tons, 1000 tons of cinders and ashes are produced, the difficulty of dealing with this quantity of refuse is by no means trifling; and it is not to be wondered at, that people residing on or near a stream should be tempted to make use of the water as the easiest means of getting rid of this sort of rubbish; the effect, however, is to transfer a nuisance from one part of the river to another, to raise the bed of the stream, to render floods more injurious, and to impede navigation.

In 1862, an Act of Parliament was passed "to protect the waters of the Mersey and the Irwell, and of certain of their tributaries, from obstruction and pollution." We were informed that this enactment had been to a great extent inoperative, as the Bridgewater Trustees, whose interest in the preservation of the navigation led them to press for the passing of the Act, had never been able to enforce its provisions.

The remedy seems to us in this case simple enough, all that is necessary being merely to find some method of carrying out an Act of Parliament. Practically, however, it is by no means so simple as it appears to be, for it requires the action of an executive body of such independent position as would enable it to disregard the many influences which would be brought to bear upon it. As, however, a similar body will be required to carry into action remedies for the other matters complained of, we leave the organization of this to be discussed hereafter.

The next evil complained of is the pollution of the river water by sewage, and by the liquid refuse of manufactories. This is indeed the principal cause of offence; for even if solid refuse were entirely excluded from the river, there would be no sensible amelioration in the nauseous condition of its water, if liquid refuse were still suffered to flow into it. Any discussion of the remedies possible under this division of our subject must of course include all methods for the prevention of the evil complained of, which may have been suggested, as well as all plans for the correction of the evil where it already exists. We now proceed, accordingly, to review the various contrivances which have been suggested (1) for the prevention of pollution by town sewage; the various plans for (2) the purification or amelioration of town sewage; and the methods by which (3) liquid refuse from manufactories may be cleansed before its discharge into streams.

POLLUTION BY SEWAGE.

I. PREVENTIVE PROCESSES.—Many suggestions have been laid before us embracing contrivances by which, as is alleged, human excrement can be kept out of the sewers, and, consequently, out of the streams into which the latter discharge themselves; but to all these there is this special objection, that they are but modes, often complicated and cumbrous, of dealing with a portion, really a scanty portion, of the excremental refuse which is poured into the streams in a liquid form.

The Common Privy and Ash-pit, and some of the modifications which they have undergone since the attention of the authorities has been turned to the condition of these ordinary receptacles of filth, must be named among the contrivances alluded to. It would, however, be unnecessary for us to comment upon the inefficacy of this method of dealing with human excrement, were it not that it has found so many supporters among the authorities of numerous Lancashire towns. The present condition of the rivers and streams which is co-existent with the general prevalence of these very receptacles, shews clearly that this mode of dealing with human excrements has but little action in keeping the river free from fæcal matter; indeed, as already stated in the descriptive part of this report, the privy only professes to receive a portion, and that the least injurious portion of the excreta; the greater portion of the urine, and the whole of the fluid refuse from the kitchen and the house generally, is passed direct into the sewer; and as rain-water finds admission to most of the ash-pits, except a few of those more recently constructed, this must act upon the soluble portion of the solid refuse, and carry it into the sewer by the drain which nearly always connects the ash-pit with the sewerage system. It is true that in some towns the ash-pits do not communicate with the sewers, and are, in fact, simply enlarged cesspools; but these are exceptional cases, and the state of the rivers in the vicinity of these towns is in no marked respect more satisfactory than elsewhere.

If, then, the privy and ash-pit does not

succeed in keeping human refuse out of the streams, all those modifications of it, such as Moule's dry-earth system, Goux's system, &c., of which we will give a brief description as exhibited to us in action, are liable to the same objection. None of them proposes to deal with other than the solid excrement, mixed with so much of the urine as is passed at the same time; they are, in fact, but modes in which a portion of the human refuse can be made temporarily inoffensive, so as to admit of its retention on the premises till it can be removed by human labour; the object of some being to retain the fæces in such a condition as may render them more valuable as manure, while that of others is merely to prevent the offensive smell; considerable mechanical ingenuity having been displayed in the applications of the disinfecting material.

We will first refer to such attempts as have been made to improve the privy and ash-pit by placing them more immediately in connexion with each other, with the view of absorbing much of that which now drains away. To this end the Manchester Corporation recommend an ash-pit under one roof with the privy, and furnished with a side grating, through which the ashes of the house are thrown and directed on to the filth below, whilst at the same time all large and coarse rubbish is kept out. To this end also Mr Beech has devised an arrangement which has been adopted in one of the poorer streets of Manchester. A space is left in front of and below the privy seat, under which the house ash is thrown, and necessarily alights exactly where it is wanted. The flooring and seat are both hinged, and fold back out of the way when the scavenger comes to clear the pit out. The whole filth, dry and wet, is then thrown out of the doorway directly into the street, and when the pit is empty, floor and seat fold down again into their original position, and take their place without having been soiled during the removal of the pit contents. Mr Morrell has also patented a contrivance for effecting the same object, a description of which will be found in vol. ii., part 4.

The only methods, however, which can rightly profess to wholly correct the evil of river pollution by town drainage, are those which claim to remove the whole of the human excrements directly from the house. But at the very outset they have, as already stated, to confess a failure. It is only privy stuff with which they deal; all the other liquid household waste, chamber slops, and laundry slops, are thrown down the back-yard grid or scullery slop-stone, and find their way through these sinks to the nearest watercourse.

The Dry-earth Closet.—The so-called dry-earth closet is much the best of these plans; and it is undoubtedly capable of being made an admirable scavenging expedient, so far as privy refuse is concerned. Of this we convinced ourselves at the Broadmoor Criminal Lunatic Asylum, where a large number of earth closets have been introduced, and are worked to the satisfaction of Dr Meyer, the resident medical officer. At Wakefield prison too, all the lower cells are provided with earth closets; and, although the closeness of a confined and narrow room was perceptible (the prisoners having been kept in till a later hour than usual on our visit), there was no offensiveness recognisable of the special kind that might have been expected. Here, however, the plan has been found applicable only to the cells on the male side of the house, in which separate vessels for the urine are provided. The earth for the Wakefield prison is dried in a kiln and supplied weekly to the closets, and the pans are removed as soon as filled; their contents, taken to a shed, are turned and pulverized, and used in the prison garden with advantage. At Halton, in Buckinghamshire, a pretty country village of 50 or 60 cottages, the roadside chalky soil is used successfully in the dry-earth closet, with which every cottage is provided. For this purpose it is screened and dried upon a kiln floor about 9 feet square; 100 bushels of coke being used in this way per annum for the fifty closets in the village. When hot and dry, the earth is carried to the hopper in the back wall of each privy, which holds about 50 lb.—enough for forty uses of the seat. The floor beneath is cemented, so as to hold

the liquid as well as the solid excrement; and the seats are hinged and on springs, so that on rising from them a portion, about 1½ lb. is discharged from the hopper, and thrown upon the mass below. We came, without notice, one evening into the village, and examined about a score of these cottages, and found everything as clean and sweet as possible. Seats and floors in front, hoppers and cesspool floor behind, were all clean; and there was nothing to be seen but white dry earth, and no smell was perceptible. Moreover, we were told that the cesspool, cleaned out as required three or four times a year, furnishes a material, which, after lying in a heap for some months under a shed, is put upon the kiln again and used a second time. Last year, 70 tons of stuff were taken out of the privies of the fifty cottages; 30 tons, however, had been used twice, so that only 40 tons were available for use upon the land; and it had proved a capital fertilizer, producing an abundant crop of grass where the manure had been applied.

In all these cases, however, the chamber slops are kept separate; and, independently of that, the success depends, not upon the people using the privies, but upon an officer, whose business it is to look after them and keep them clean. Even at Halton, one man is set apart for this work, who attends to the kiln, to the provision of dried earth, to the keeping the hoppers full, and to the removal of the manure. Elsewhere we have known earth closets introduced for the use of cottagers accustomed to the old privy seat and cesspool; and, requiring special service and attention, which the average man or woman will not give, they soon became filthy and offensive. Add to these circumstances the enormous aggravation of all the difficulties of the plan, when not fifty but fifty thousand households have to be provided with the necessary appliances, and induced to work them properly, and we can have no hesitation in pronouncing the dry-earth system, however suitable for institutions, villages, and camps, where personal or official regulations can be enforced, entirely unfitted to the circumstances of large towns.

At Lancaster, indeed, an attempt has been made by a neighbouring landed proprietor, Mr W. J. Garnett, of Quernmore Park, to get the house scavenging of the town done upon a modification of this plan, and to deal with the whole excrement of the household upon the dry-earth system. By constant and even daily collection in tubs and pans the whole excrement is collected from a large number of houses, and the payment of 1d. a-week per house is said to secure the collection of the chamber slops as well as of the privy contents. Nearly one-tenth part of the town is thus dealt with. Earth is sent round daily, and thrown into the privy holes, and when the pit is full, the whole is taken to a depot, where it is mixed with material, derived partly from street sweepings and ash-pit refuse; and being thereafter piled beneath a shed built upon a farm near the town, the whole is soaked with the collected urine.

A sample carefully taken being analyzed in our laboratory proved to contain—

Organic matter and ammonia containing .207 of total combined nitrogen	6.671
Mineral matter containing .326 of phosphoric acid	66.782
Water	26.547
	100.000

These figures indicate a practical value certainly much below that at which we had been led to estimate it by mere inspection; and it is manifest, from the very small amount of total combined nitrogen, that much of the urine escapes preservation. An inordinate quantity of earth appears also to have been added to the excrementitious matters, since more than 93 per cent. of the finished manure consisted of nearly worthless mineral matters and water.

The "Eureka" System.—Some mention should be made of the plan of dealing with human excrement which was carried out a few years ago at Hyde, near Manchester, although it has been abandoned, owing to the great local nuisance which the manufacture created, and the insufficient returns realized

by its promoters, and we have not, therefore, had an opportunity of examining it. It has been thus described by Mr J. B. Lawes, F.R.S., and Dr J. H. Gilbert, F.R.S. :—

Some few years ago, a company contracted to carry out what they called the "Eureka system" here. They provided boxes to fit in at the back of the privy, or closet, of nearly every house, leaving scarcely a water-closet in the place. Some disinfecting or deodorizing mixture is put into the box before it is placed in its position, and the box is exchanged for a fresh one after a certain number of days, according to the number of individuals frequenting the place; and it is stipulated that neither extraneous water nor any other than human excretal matters should be accumulated in these receptacles. The boxes, when removed, are covered with closely-fitting lids, and so transported in close vans to a manure manufactory close to the town. Here the matters are first well mixed, and then strained to remove rags, which are washed and sold for paper-making. More disinfectant is then added, and the matter concentrated by distillation, the distilled water being sold to dyers and bleachers. The residue thus thickened is then mixed with coal ashes, which are collected in the houses in casks left for the purpose, and before being used are re-burnt in a reverberatory furnace, and finely ground. On visiting Hyde in 1863, it certainly appeared that the mode of collection and preparation adopted was attended with, at any rate, very little unpleasant odour, and it was maintained by the advocates of the system that its adoption had been successful in a sanitary point of view, though even at that time some difference of opinion existed, and a controversy on the subject was in progress. The opposition had reference not to the mode of collection, but to the conducting of the manufacture so near to the town. But whether or not the plan of collection and removal may have proved successful, so far as the avoidance of nuisance and injury to health are concerned, the process of manufacture seems unfortunately to offer but little prospect of successful utilization, so far at least as can be judged from the results of an analysis made at Rothamsted, of a sample of the manure obtained direct from the works. It was found to contain only between 1 and 2 per cent. of ammonia. Such a manure, although it might be useful enough when applied in quantities of many tons to the acre, would obviously be not worth more than its carriage beyond the distance of a very few miles. Besides the great dilution of the more valuable manure matters by the admixture with ashes, a little consideration of the habits of the people is sufficient to account for the small quantity of ammonia found in the manure; for it is obvious that little of the urine beyond that passed once a-day with the fæces would reach the boxes, and so find its way into a manure thus collected and prepared.

The plan has at length been abandoned for both of the reasons referred to by Messrs Lawes and Gilbert.

Goux's System, described in detail in vol. ii., "Minutes of Evidence," part 4, is one of a similar kind, differing from the Eureka plan mainly in the subsequent treatment of the excrement. This is not dried by heat, but allowed to ferment along with the drying and absorbent material used in its collection. The filth is collected from house to house in tubs lined with a layer of absorbent material, and these tubs are removed at short intervals, as experience declares to be required. Gathered at a depot, the whole contents, ordure, liquid, and the fibrous lining, are cleared out and turned over, and the vessels are sent back to the privies. Each of the receiving tubs is filled to a certain depth with dust, chaff, house sweepings, ash, or other absorbent stuff. A conical core, smaller than the tub, is then pressed down upon this layer, and the space between it and the outside vessel is filled in like manner with similar absorbent refuse matters. The core is then removed, and the tub is taken to the privy, and placed below the seat. Every day one-fifth or thereabouts of the tubs are taken to the works, empty vessels being put in their places. The contents are collected on a floor, sprinkled with a little sulphuric acid, and, after a certain amount of fermentation, and consequent destruction of the fibrous matter, the whole becomes a homogeneous, inoffensive, but feeble manure, which may be very fairly described in the words used by Messrs Lawes and Gilbert about the Eureka failure. We saw the system in operation to a certain extent at Rochdale; where, in August 1869, according to the Report of the Sanitary Committee of the Town Council, who had charge of the experiment, 342 closets were then being treated on this plan.

It must be remembered, as regards all these expedients, not only that it is but a part of excrementitious matter which is dealt with, but that, even as regards that portion of the excrement which they do remove, they so entirely depend upon efficient cleanly superintendence and direction, that wherever they

have merely had the average man to work them they have failed. Moreover, this very frequent collection of filth by hand from houses, and its removal sometimes through the cottages themselves, almost necessarily under the eye and nose of the household, whatever may be the importance of the economic object aimed at, is universally condemned by our domestic habits as nasty and offensive. They can never be an entire success, and in competition with the water-closet, a jury of householders will certainly condemn them for lack of cleanliness and comfort.

The above account of these, which may be termed "preventive processes," will be sufficient to justify the statement we have made of their inefficiency to hinder the pollution of the rivers and streams; they do not, of course, profess to have any remedial action upon water which has been polluted.

We have now to discuss those processes whose object has been to *purify sewage*.

II. THE PURIFICATION OF SEWAGE.

The cleansing of sewage has engaged the attention of many chemists and others during the past ten or fifteen years; and various plans, some exhibiting great merit and ingenuity, have been proposed for dealing with the offensive liquid. We have had opportunities of seeing in actual operation, upon a large scale, several of the most promising of these plans, which all belong to one or other of the three following categories:—
1. Treatment with Chemicals; 2. Filtration; 3. Irrigation.

1. *Purification of Sewage by Chemical Agents.*—The valuable constituents of sewage present to the chemist a mine of wealth, which, despite so many failures, has constantly stimulated him to renewed efforts for their extraction in a portable and consequently marketable form.

The chief valuable ingredients of sewage are, first, the different forms of combined nitrogen, and second, phosphoric acid. The money value of these constituents *dissolved* in 100 tons of average sewage is about 15s., whilst the *suspended matters* contain only about 2s. worth of them.

There is but little difficulty in extracting the suspended matters by filtration, but as these do not contain quite one-seventh of the total valuable constituents, the process, though simple, has never been remunerative; and inasmuch as it still leaves much putrescible organic matter in solution, the mere extraction of the suspended matters of sewage, although doubtless tending to mitigate nuisance, does not produce any substantial diminution of the polluting quality of the liquid. The operations of the chemist have, therefore, been directed chiefly to the soluble constituents of sewage; and have had for their object, either the precipitation in a solid form of the valuable, but offensive ingredients, so as to convert them into portable manure, or, secondly, the rendering them inoffensive by the action of disinfectants. Although these operations have not been altogether unsuccessful, they have hitherto entirely failed in purifying average sewage to such an extent as to render it admissible into running water. We have formed this opinion both from observations of the polluting effect of such chemically purified sewage upon the streams into which it was admitted, and from the amount of putrescible organic matter revealed by the chemical analysis of the sewage after treatment.

The following is a description of those processes belonging to the chemical category which we have witnessed in operation:—

(a.) *Treatment with Lime.*—This process was doubtless first suggested by the ingenious operation devised by the late Dr Clark, of Aberdeen, for softening certain hard waters. It has been applied to sewage upon an extensive scale at Tottenham for the manufacture of "Tottenham Sewage Guano;" at Blackburn, and especially at Leicester, in the production of the so-called "Leicester Bricks" (the name under which the manure was sold). In all these places the plan has been a conspicuous failure, whether as regards the manufacture of valuable manure, or the purification of the offensive liquid.

We have witnessed the process at Blackburn, and on two occasions at Leicester, where it is still used, the machinery employed

at the latter place being very perfect and efficient.

At both places, the method obviously failed in the purification of the sewage to such an extent as to render it admissible into a river. At Blackburn especially, the river below the outlet of the limed sewage was in a most offensive condition of putrefaction, our note made at the time of our visit being as follows:—"Horribly offensive, turbid, blackish stream, disengaging most offensive gases, with black masses of putrid mud floating on the surface."

The operation is exceedingly simple, and, as carried out at Leicester, consists in mixing with the sewage, as it arrives at the works, a certain proportion of milk of lime; the mixture is then violently agitated by appropriate machinery on its way to large reservoirs of subsidence, in which a copious deposit of highly putrescible mud takes place, whilst the supernatant liquid flows off in a comparatively clear though still somewhat milky condition. The floors of the reservoirs of subsidence slope from two opposite sides towards the centre, where there is a gutter, from which a Jacob's ladder elevates the slush into a shoot, through which it is conveyed to pits, where it slowly dries, partly by evaporation, and partly by soakage into the surrounding soils.

During a second visit to Leicester, however, we submitted the lime process to a much more searching investigation, side by side with another chemical plan (Sillar's), and it will, therefore, be convenient to describe the results of these two sets of experiments together.

(b.) *Treatment by Sillar's Patent, or "A.B.C." Process.*—The specification of this process is given by the patentees Messrs W. G. and R. G. Sillar and W. G. Wigner, as follows:—

We add to the sewage to be purified a mixture consisting of the following ingredients:—Alum, blood, clay, magnesia, or one of its compounds, by preference the carbonate or the sulphate, manganate of potash, or other compound of manganese, burnt clay, otherwise known as ballast, chloride of sodium, animal charcoal, vegetable charcoal, and magnesian limestone. Of these substances the manganese compound, the burnt clay, chloride of sodium, and magnesian limestone, may be omitted, and it is not essential that both ani-

mal and vegetable charcoal should be used. If any of the ingredients named should, from any cause, be present in sufficient quantity in the sewage, it may, of course, be omitted from the mixture. The proportions in which the ingredients are to be used vary according to the nature of the sewage to be purified, as, for instance, if a large proportion of urine is present, we increase the proportion of clay; if the sewage is much diluted, we slightly increase the proportion of alum and blood; if it contains a large proportion of street refuse, we decrease the proportion of clay.

For ordinary sewage, the following proportions have answered well:—

Alum	600 parts.
Blood	1 „
Clay	1900 „
Magnesia	5 „
Manganate of potash	10 „
Burnt clay	25 „
Chloride of sodium	10 „
Animal charcoal	15 „
Vegetable charcoal	20 „
Magnesian limestone	2 „

These substances are mixed together, and added to the sewage to be purified until a further addition produces no further precipitate. The quantity required will be about 4 lb. of the mixture to 1000 gallons of sewage. In many cases it is preferable to mix the above compound with a small quantity of water, and add it in a liquid state to the sewage. The sewage must then be thoroughly mixed with the compound and allowed to flow into settling tanks. The greater part of the organic and other impurities will be immediately separated in the form of large flakes, which rapidly fall to the bottom, leaving the supernatant water clear and inodorous, or nearly so. The water may then be allowed to flow away into a river, or be disposed of in any other way, and the sediment or mud allowed to accumulate at the bottom of the tank. In some cases it is preferable to add the compound of manganese to the water after the sediment produced by the other ingredients has been allowed to subside. The sediment will be found to possess the power of precipitating a further quantity of sewage; it must therefore be pumped, or otherwise taken from the tank, and mixed with fresh sewage, the sediment being allowed to subside in the same way as before. The sediment may be used five or six times over in this way. When the sediment no longer possesses the power of precipitating the impurities in the sewage it must be removed from the tank and allowed to dry; when partially dry a small quantity of acid, by preference sulphuric acid, may be mixed with it, which will retain all the ammonia in a soluble form. When dried, the sediment will be a valuable manure.

Our experiments at the Leicester sewage works were so arranged that one-half of the sewage could still be treated with lime as

usual, whilst the remaining half was submitted to Sillar's process under the superintendence of the patentees. In this way we were able to ascertain, not only the extent to which the sewage was ameliorated by the new method, but also the comparative effect of the old lime process when applied to one-half of the same sewage.

The experiments extended over three days. On the first day, a sample of the sewage as it arrived at the deodorizing works was taken at 1.30 P.M., and samples of the effluent liquid, after treatment by the lime and Sillar processes respectively, were collected at 5.40 P.M. and 6.10 P.M., the intervals of time being those calculated as necessary for the passage of the sewage through each of the two processes. On the second day, hourly samples of the raw sewage were taken from 10 A.M. to 9 P.M.; but during the morning an accident happened to a portion of the apparatus which vitiated the experimental results, and consequently the samples, after treatment, were taken only from 4 P.M. to 8 P.M. in the case of the lime process, and from 4 P.M. to 9 P.M. in that of Sillar's process. On the third day, all the samples were taken hourly, from 10 A.M. to 5 P.M. After our departure from Leicester, on the first day, the duty of taking the samples was entrusted to Mr W. Thorp, the principal assistant in the laboratory of the Commission.

Before proceeding to interpret the results of the analyses, it is necessary to premise that the strength of sewage, as regards dissolved constituents, is ascertained by two analytical determinations, viz., "total solid matters in solution" and "total combined nitrogen." A comparison of the numbers under these heads, obtained from the samples of raw sewage collected on each of the three days of the experiments, and on the occasion of our first visit to Leicester (May 13, 1868), shews that the sewage of this town is much below the average strength, being less than one-third as strong as London sewage, and that it does not seem to vary in strength between very wide limits.

In regard to clarification, both processes produced a very considerable, and on the

whole, nearly equal effect. On the first day, the effluent liquids were nearly equally clear; on the second day, the limed sewage was decidedly superior to its rival; whilst on the third day, the sewage treated by Sillar's process was much clearer than the limed liquid. These statements rest upon the following comparison of the quantities of suspended matters remaining in 100,000 lb. of the effluent sewage, as well as upon ocular observations made during the three days' experiments:—

Suspended Matters.

	After Lime Process.	After Sillar's Process.
1st day .	6.00 lb.	6.12 lb.
2d „ .	2.84 „	4.36 „
3d „ .	6.56 „	2.76 „

Both processes have the effect of diminishing the organic carbon, and on each of the three days the diminution effected by Sillar's process was notably in excess of that brought about by the lime process.

The material, however, which it is of the greatest importance to remove from the dissolved constituents of sewage, is nitrogenous organic matter, because it is this kind of organic matter which enters rapidly into putrefaction, and becomes an active agent in the pollution of rivers. This material is represented in the analytical results by organic nitrogen. It is precisely here that both processes signally fail (although the lime process is slightly superior to the other) in accomplishing such an amount of purification as would render the sewage admissible into an open water-course. The raw sewage on the third day was, as already mentioned, very far advanced in decomposition, and the effect of both processes upon this sewage was actually to increase the amount of organic nitrogen in solution; that is, the amount of organic nitrogen dissolved from the suspended matters of the sewage was greater than that precipitated from solution by the chemical re-agents added. Leaving out of consideration this result, which must be regarded as abnormal, the following shews the amelioration effected by the two processes:—

Per-centage of Organic Nitrogen Removed.

	Lime Process.	Sillar's Process.
At Leicester, 1st day,	65.79	58.86
„ 2d day,	54.48	50.07

It may be stated, therefore, in round numbers, that, as regards putrescible organic matter, the application of either process would render it possible to double the amount of purified sewage admitted into a river without increasing the pollution. Although this is by no means an unimportant result, yet it falls far short of what is required to restore our sewage-polluted rivers to a satisfactory degree of purity.

The effluent sewage after treatment by the new process invariably contains more ammonia than the raw sewage: thus, on the first day, 100,000 lb. of sewage contained 1.650 lb. of ammonia before treatment, and 2 lb. after treatment; on the second day, 1.8 lb. before and 2.5 lb. after treatment; whilst on the third day it contained 2.25 lb. before and 3.5 lb. after treatment. The origin of this additional ammonia is not difficult to understand; in the first place, alum enters largely into the composition of the material used in the "A.B.C." process, and as nearly all alum now manufactured is ammonia-alum, containing 3.7 per cent. of ammonia, it is probable that this is one source of the additional quantity of ammonia. But it cannot be the only source, unless we are to assume the use of such a large proportion of alum as would render the process economically impracticable. The second, and probably the chief source of the additional ammonia, is to be sought for in the action of the chemical re-agents upon the nitrogenous organic matters contained in the raw sewage, partly in suspension and partly in solution. The possibility of such a liberation of ammonia is seen in the case of the limed sewage of the first day; here no ammonia was added in the re-agent, nevertheless, there was an increase of .475 lb. in each 100,000 lb. of sewage. Such an addition to the amount of dissolved ammonia has no significance as regards the pollution of rivers, but it has an important bearing upon the applicability of the process to the economical production of a solid manure, because it indicates not only that the ammonia already in solution in the raw sewage is not precipitated, but also, that some of the suspended nitrogenous matters are decomposed

with the liberation of ammonia, representing so much valuable material abstracted from the solid manure.

Notwithstanding this loss of nitrogenous organic matter in the process of deodorization, the "A.B.C." method of treatment still yields a solid manure of much greater value than that obtained by the lime process—a circumstance which is explained, to a great extent, by the acidity of the mud from the former process, and the alkalinity of that from the latter. The lime mud thus loses ammonia in drying, whilst the other, especially if still further acidified, cannot suffer this loss.

Both samples of mud submitted to analysis were first dried in the sun, with free exposure to the air, so as to imitate, as nearly as possible, the process of drying such manure which is usually employed on the large scale. By analysis, the following results, expressed in per-centage numbers, were obtained :—

Composition of Sewage Mud.

At Leicester.	Dry Mud from Sillar's Process.	Dry Mud from Lime Process.
Mineral matters	54.772	37.413
Organic and other volatile matters	45.228	62.587
Carbon	24.994	18.865
Phosphoric acid	.496	.147
Total nitrogen	1.943	.849
Ammonia	.185	.090

It is thus evident, that in the three valuable constituents of manure, viz., in ammonia, in other forms of combined nitrogen, and in phosphoric acid, the manure obtained by Sillar's process is greatly superior to that resulting from the treatment with lime. Unfortunately, some doubt is thrown upon the source of the increased amount of phosphoric acid present in the manure obtained by the former process, because, bone-black, in, to us, unknown quantity, entered into the composition of the precipitating material used, and thus an uncertain amount of phosphoric acid was added to that which was actually derived from the sewage.

The value of the two manures, as estimated from the above chemical composition, is as follows:—Manure from lime process, 13s. 5¼d. per ton; manure from Sillar's process, £1, 13s. 0¾d.

The value of the solid manure obtained by treating the Leicester sewage with lime has already been estimated, from the analyses of Voelcker and Versmann, by Hoffmann and Witt, who give the following numbers :—

	Voelcker.	Versmann.
Value per ton	15s. 5d.	17s. 0d.

That these values exceed our estimate is partly due to the circumstance that Hoffmann and Witt assigned a value of £1 per ton to non-nitrogenous organic matter, whilst we regard it as worthless. Such is the value of these deposits as estimated from chemical analysis; but experience has warned the manufacturer of these feeble manures that the value indicated by chemical analysis cannot be counted upon in the market. Thus, the dry Leicester mud, although its indicated value is 13s. 6¼d., is actually sold for 1s. per ton!

In conclusion, the results of the experiments may be thus summarized :—

1. The "Sillar" and lime processes remove to a great, and nearly equal extent, the suspended matters contained in sewage.
2. Sillar's process increases the amount of dissolved solid matters in sewage, but reduces the quantity of putrescible organic matter. The lime process reduces both the amount of dissolved solid substances and the quantity of putrescible organic matter; the reduction of the last being about the same as that effected by Sillar's process, viz., rather more than one-half.
3. Both processes fail in purifying sewage to such an extent as to render it admissible into running water.
4. For the manufacture of solid manure from sewage, Sillar's process is greatly superior to the method of treatment by lime, although it fails to extract from the liquid more than a very small fraction of its valuable constituents.

Since the above experiments were made, the chemical treatment, as described in Sillar's

specification, has been supplemented by a subsequent process of filtration (not intermittent) through animal charcoal, sand, and gravel. At the request of the patentees we recently (Dec. 11, 1869) inspected this process at Leamington, where it has for some months been carried out upon the whole sewage of the town. We took half-hourly samples, for six hours, of the sewage before and after treatment; but, unfortunately, a fall of rain augmented the quantity to such an extent as to render the filtration of the whole volume of sewage, after chemical treatment, impossible. A large and unknown proportion was allowed to flow unfiltered into the Leam, and, consequently, no satisfactory average sample of effluent water from the filters could be collected.

III. SUGGESTED REMEDIES.

Treatment by Lime and Chloride of Iron.

At Northampton this process is applied to the sewage of 40,000 people; 4400 houses are here connected with the drains, and 2800 are undrained. The excellent and constant water supply of 600,000 gallons daily, or 15 gallons per head, is derived chiefly from deep wells in the oolite. The sewage works are situated about half a-mile from the town. Eight million gallons of sewage is here mixed with 12 bushels of lime, and about six gallons of chloride of iron (in hot weather more, in cold weather less). The lime is added first and then the chloride of iron. The defecated sewage is afterwards submitted to upward filtration through a stratum of calcined iron ore 8 inches thick; but we consider that beyond the separation of suspended matters, which would be equally effected by subsidence, this latter operation is nearly useless. The effluent sewage, after a flow of $1\frac{1}{2}$ mile through a culvert, in which it becomes mixed with about one-sixth of its volume of spring water, is discharged into the river Nen, in a nearly clear and apparently innocuous condition. We examined the stream for about one-third of a mile below the outfall, and could perceive no sewer fungus or other sign of sewage pollution. Nevertheless, analysis shews that the sewage dis-

charged into the stream still contains in solution a large amount of putrescible organic matter; but the putrescence of this matter was doubtless delayed, by the chloride of iron used in the treatment, until the stream had flowed beyond the point where we examined it. It is well known that chloride of iron possesses this property in a very remarkable degree, but the putrefaction of the disinfected sewage is only delayed and not ultimately prevented. In fact, the river Nen does eventually become putrid in consequence of the discharge into it of the Northampton sewage; and an injunction has been granted by the Court of Chancery restraining the Improvement Commissioners from discharging the sewage of the town into the river after the 1st of June 1870.

The chloride of iron in solution is manufactured on the premises at a cost of £6 per ton. A sample of it which we brought away with us contained in 100,000 parts,—

Iron as perchloride . . .	4413.7
„ protochloride . . .	9124.3
	13538.0

Treatment with Crude Sulphate of Alumina, and subsequent Filtration through Coke.—

This process, which is known as Bird's, is carried out at Stroud, in Gloucestershire. From 150,000 to 200,000 gallons of sewage are daily treated with 6 cwt. of pulverized clay, to which 120 lb. of sulphuric acid have been added some days previously. The sewage is made to turn a small waterwheel which regulates the delivery from a hopper of the sulphated clay, or crude sulphate of alumina, which falls into the stream of sewage on its passage to a settling tank, whence it flows under a second hopper, from which it receives a second dose of the sulphated clay. Thence it flows into a depositing tank, and afterwards through three coke filters. The coke is renewed in the first filter every fortnight, and in the last every month. The foul coke is burnt under the boiler.

We visited the works on October 23, 1869, and took half-hourly samples of the sewage from 9.10 A.M. to 12.10 P.M., and of the effluent water from 10.10 A.M. to 1.10 P.M.

The samples of each were mixed together, and a specimen of each average sample was then taken for analysis. From the analysis of both average samples it is evident, first, that the sewage was very weak, and second, that the effluent liquid, though much improved, was still not of the degree of purity which would render it admissible without nuisance into a clean river. Moreover, if stronger sewage were treated, the effluent water would doubtless be still more objectionable. It was always somewhat turbid, but nearly inodorous.

Treatment with a Mixture of Sulphate of Iron, Lime, and Coal Dust:—Holden's Process.

—Letters Patent, dated 10th November 1866, and sealed 5th January 1867, were granted to Henry Adrien Bonneville, of the County of Middlesex, Patent Agent, for an invention of "An improved manure obtained by an improved process of purifying foul waters," being a communication from Jules Houzeau, and Eugene Devedeix, of Paris, manufacturers. This process has recently been carried out on a considerable scale with a portion of the sewage of Bradford, Yorkshire, by Mr Angus Holden of that town, and has hence become commonly known as Holden's process. The patentee thus describes the nature of the invention:—

The invention communicated to me relates to an improved process of using mineral substances, or such as are of vegetable origin combined with lime, in order to obtain the purification of those waters which come from factories, households, closets, gutters, and sewers, in fine, all such foul waters as are now thrown away as useless. To effect this the following materials are used:—

"1°. The lignites in general (a production of vegetable origin; arising from the decomposition of plants which have not entirely undergone the coal transformation, friable or not, whatever may be the colour.

"2°. An imitation of the lignites, which may be obtained by means of pit coal in a pure state, the ashes of said pit coal after burning, or the coke resulting from the carbonization of this pit coal, and finally charcoal, and all artificial coals, sulphate of iron, commonly called copperas.

"3°. Clay, commonly known as potter's clay, which mixed with the substance indicated in the above-mentioned paragraph.

"4°. Lime, which must always be used concurrently with one of the above-mentioned substances, and after being slacked.

The proportion of lignites to be employed varies

between 4 and 6 drachms or thereabouts (about 2 to 3 grammes), per quart, and that of the lime between 2 and 6 drachms or thereabouts (about 1 to 3 grammes), also per quart, according to the nature of the waters to be treated; that of the pit coal, of the ashes, coke, and all natural and artificial charcoals, is from 4 to 12 drachms or thereabouts (about 2 to 6 grammes), according to their richness; and limewhite is always added in the above given proportions.

"One of the above-mentioned products is made use of either by throwing it into the water to be purified, or by reducing it into a dissolution, the density of which varies according to the greater or lesser purity of the water to be treated, always adding limewhite to it. The two mixtures thus being performed, a coagulation takes place which settles almost immediately, leaves a sediment or residue, which has seized upon the organic matter, and the water becomes limpid.

"The deposit or residue being properly dried, may be used to great advantage for agricultural purposes as manure, the proportion of which varies according to the greater or lesser density of the liquid purified.

We saw this process in operation, and took samples of sewage and effluent water on the 5th and 6th of October 1869. We were informed that 130,000 gallons of sewage were being daily treated. The sewage was conducted from the Bradford outfall sewer by a branch conduit, and having been mixed with sulphate of iron, lime, and coal dust, was passed into a series of subsidence tanks, in flowing through which it occupied about twenty minutes. The effluent water which issued from the last of this series of tanks was of a yellowish tint, and perfectly transparent. Subsequently, Mr Holden forwarded to us average samples of sewage and effluent water taken hourly during several hours, on the 2nd of December. We have submitted all these samples to analysis, and it shews that whilst this process, like most of those already mentioned, separates the whole of the suspended matters, it not only fails to remove the putrescible organic matters in solution, but actually (as measured by the organic nitrogen contained in these organic matters) increases their quantity. This it does by causing some of the putrescible organic matter in suspension in the original sewage to pass into solution. The effluent water could not, therefore, be admitted into rivers without causing pollution. Further, the very large amount of lime and sulphate of iron added, not only

enormously increase the amount of solid matter in solution, but, by their mutual decomposition into hydrated oxide of iron and sulphate of lime, communicate to the effluent water a degree of permanent hardness so excessive as to render its admixture with water, to be afterwards used for manufacturing purposes, extremely objectionable.

We have already stated that the manure value of the suspended matters in sewage is less than one-seventh of that of the matters in solution, and as Holden's process only extracts the suspended matters, for a certain small amount of ammonia which adheres to them is to a great extent dissipated during the subsequent drying of the manure, it follows that the manure manufactured by this process can have no considerable value, a conclusion which is confirmed by the analysis of a sample of the subsided mud which we brought away with us, and allowed to dry spontaneously in the air; 100 parts of this air-dried mud contained,—

Mineral matters containing .3 part of phosphoric acid .	50.35
Organic and other volatile matters containing .004 of ammonia, and .555 of or- ganic nitrogen	43.01
Water	6.64
	—
	100.000

The ammonia contained in the mud before drying was equivalent to .009 per cent. in the air dried mud.

A manure of the above composition may be considered as practically worthless.

Purification of Sewage by Filtration.—The process of filtration through sand, gravel, chalk, or certain kinds of soil, if properly carried out, is the most effective means for the purification of sewage to which reference has yet been made; indeed, irrigation, as now carried out, owes no inconsiderable amount of its success to the contemporaneous effect of the filtration of the sewage through the soil of the irrigated fields; for it is precisely in those cases in which the sewage is absorbed and disappears in porous land, that we have

observed, in the effluent water from drains, the most complete purifying effect.

Excellent examples of this kind of purification are met with in London itself. Chemical analysis shews that the water-bearing gravel of London is supplied almost exclusively by sewage, and the water pumped from the shallow wells in London is little else but filtered sewage. Now, although this water cannot be used for domestic purposes without great risk to health, it is so bright, colourless, and sparkling, and contains, moreover, such a minute proportion of organic matter, that the most fastidious could not object to its admission into running water. The large quantities of nitrates and carbonic acid, the products of the oxidation of *fæcal* matters which this water contains, impart to it a cool and agreeable taste, which notoriously causes it to be preferred by many of the inhabitants of the metropolis, to the much purer but more tasteless water supplied from the Thames and the Lee. The ornamental lake in St James' Park being fed from a well upon Duck Island sunk into the water-bearing gravel, may be correctly described as filtered sewage, mixed, probably, with a certain proportion of water from the neighbouring Thames; if, therefore, this water, being stagnant, is perfectly inoffensive, *a fortiori* it might be admitted in any quantity with impunity into a running stream. The purification thus effected consists in the separation of suspended matters, and in the transformation of the putrescible organic matters in solution into innocuous mineral compounds, such as ammonia and salts of nitrous and nitric acids.

We have become acquainted with only one instance in which simple artificial filtration has been resorted to for the purification of sewage. This occurs at Ealing, and the process is carried on as follows:—

The sewage is received into two deposit tanks, each 64 feet long by 10 feet wide, and 8 feet deep. These deposit tanks are divided each into five chambers, by planks having small openings to admit of the passage of sewage water; in the fourth chamber a rough filter of gravel or burnt ballast is formed, through which the sewage passes by ascen-

sion. Between the deposit tanks and the first set of filter beds, are two iron baskets containing charcoal closely packed; after passing through these baskets, the sewage is received into the first set of filters, and rises through 18 inches of burnt clay ballast, which is now used in preference to gravel and sand.

The water then flows over the weir at the end of the first set of filters into chambers containing wire baskets filled with burnt clay ballast, and is led by iron pipes into the second set of filter beds, where all the heavier suspended matter contained in the sewage water is deposited, the liquid then rising through 2 feet of burnt clay ballast.

The capacity of the deposit tanks and of the spaces under the filter beds which are employed as deposit chambers, amounts to 17,500 cubic feet. The area of filters in deposit tanks is 240 superficial feet; that of the first set of filter beds is 630 superficial feet, and that of the second set of filter beds is 1000 superficial feet. There is thus a total area of 1870 superficial feet; and the sewage in its transit passes in all through 7 feet 4 inches of filtering materials.

The soil collected in the deposit tanks and filters is removed through cast-iron valves placed 13 feet apart, and drops into vaults below, and is afterwards mixed with the dust and ashes collected by the scavenger, and sold for manure.

The process as thus carried out entirely fails to transform the soluble putrescent organic matters into innocuous mineral compounds. This failure is due partly to the filters being far too small for the volume of sewage dealt with, and partly to the circumstance that the filtration is performed upwards instead of downwards. For efficient purification by filtration, it is essential that atmospheric oxygen should have frequent and free access to the interior of the filter, a condition which is entirely excluded in upward filtration. Nevertheless the filtered sewage was being run into the Thames by permission of the Board of Conservators under the following certificate, extracted from a report dated October 1868, by Mr Charles Jones, Sur-

vveyor to the Local Board of Health, Ealing:—

“London Hospital, March 21, 1868.

“The sample of liquid contained in the bottle marked A, 16th March 1868, which was sent here on the 16th of March, is a very weak solution of carbonate and sulphate of ammonia, with a little calcareous and organic matter and common salt.

“The total amount of these matters is only about 56 grains per imperial gallon, and therefore the liquid is perfectly harmless to animal and vegetable life, and is not offensive.

(Signed) “HRY. LETHEBY.”

On the occasion of our visit to the sewage works at Ealing, one month later we were informed that a mean daily volume of 400,000 gallons of sewage, from a population of about 7500, was being treated. The time of its transit through the series of filter beds was only ten minutes. The suspended matters were of course to a great extent arrested, but the effluent liquid retained nearly all the original amount of soluble putrescible organic matter, and was totally unfit to be admitted into running water.

The causes of the failure of sewage filtration at Ealing are sufficiently obvious; they are, first, the inadequacy of the mass of filtering material; and, secondly, the absence of all provision for the frequent aeration of that material.

Moreover, even that vast mass of material would not exercise its purifying effect unless it were frequently aerated, which is best effected by dividing it equally between two filters, and allowing the sewage to flow upon them alternately for six or twelve hours, thus giving the alternate six or twelve hours for aeration. In order that this latter process may be effected, it is of course necessary that the effluent water should flow freely off from the bottom of the filter, so that as the last portion of each dose of sewage sinks into the filter, it may draw atmospheric air into the pores of the material from the surface downwards.

Finding from preliminary trials that filtration, properly conducted, is a most efficient means of purifying sewage, we made an extensive series of experiments in order to de-

termine—first, the best material to be used as a filtering medium; second, the amount of sewage which can be effectively purified per cubic yard of material; and, third, the best mode of conducting the filtration. For this purpose the filtering material was placed in glass tubes 16 feet long and 2 inches internal diameter, and in glass cylinders 6 feet long and 1 foot in diameter.

The first set of experiments was made with two of the long glass tubes charged, the one with sharp siliceous sand, the other with a mixture of equal parts of sand and coarsely powdered chalk. London sewage from the outfall of the Regent Street and Victoria Street sewers in Scotland Yard was passed continuously upwards through one of these tubes so as to exclude aeration, and subsequently downwards in successive doses through both, so as to cause the air to follow the sewage down the tube between each two consecutive doses. The effluent water was submitted to analysis once a-week.

The process of *upward* filtration through sand is inefficient in the purification of sewage from soluble offensive matters. The large amount of organic carbon, and especially of organic nitrogen, exhibited in the analyses shewed that on no occasion was the effluent water in a condition fit to be admitted into running streams. The analyses also shewed that nitrification (the generation of nitrates and nitrites) took place only so long as the pores of the sand still contained air with which they were, of course, filled at the commencement of the experiment. A set of experiments was then made in the same tube still charged with the same material, the conditions of filtration being altered from the continuous and upward system to the intermittent and downward system. A similar set of experiments was also made with the second tube filled with the mixture of sand and chalk, as above described.

The results proved that the process of intermittent downward filtration, through either sand or a mixture of chalk and sand, effects a very satisfactory purification of sewage when the sewage treated amounts to

5.6 gallons per cubic yard of filtering material in twenty-four hours, but that the purification becomes uncertain and unsatisfactory when the rate of filtration is doubled, that is, when the sewage treated amounts to 11.2 gallons per cubic yard in twenty-four hours. These experiments also shew that the process of purification is essentially one of oxidation, the organic matter being, to a large extent, converted into carbonic acid, water, and nitric acid; hence the necessity for the continual aeration of the filtering medium which is secured by intermittent downward filtration, but entirely prevented by upward filtration.

Up to the rate of flow of 5.6 gallons per day of twenty-four hours per cubic yard of filtering material, all the samples analyzed were sufficiently purified to be admitted into any stream without any apparent pollution of the latter; the undiluted effluent sewage being clear, colourless, or nearly so, and sparkling. Only as a source of drinking water could a stream into which such purified sewage flows be condemned.

These experiments reveal the true cause of the comparative freedom of rivers from excremental pollution, whilst the fever-breeding cesspool system was in full operation. The liquid dejecta of our towns, doubtless, found their way to streams then as now, but they were compelled to soak through many feet of porous and more or less aerated soil, where the organic matter became oxidized. Even in our most densely populated towns, Liverpool, for instance, with a population of nearly 100 per acre, the area of soil falling to each person, assuming it to be only 1 yard deep, is ten times more than is necessary for the purification of each person's sewage; for even assuming each person to be an adult, furnishing 30 gallons of sewage (of the quality of London sewage) per day, each cubic yard of soil would then receive, in twenty-four hours, only .62 gallon of sewage.

As this purifying action of soils has an important bearing upon the question of sewage irrigation, we thought it desirable to extend these experiments to natural soils, and to perform them upon a somewhat larger

scale. For this purpose we had a number of glass cylinders blown, 6 feet long and 10½ inches in diameter. These cylinders were open at both ends, they were placed perpendicularly with their lower ends resting in a shallow earthenware tray. A glass tube, open at both ends, passed down the axis of the cylinder, to within about 3 inches of the lower extremity. The object of this tube was to allow air or gas to escape freely from the lower part of the cylinder, so that the passage of the sewage through the filtering material might not be retarded. A layer of small pebbles about 3 inches deep was placed at the bottom of the cylinder; upon this rested a stratum, about 5 feet thick (about 3 cwt.), of the soil to be experimented upon; and finally, in some cases, a layer of fine sand about 1 inch deep was put upon the top of the soil, to prevent the coarse suspended matters in the sewage from passing into the soil. This still left ample space at top for the sewage, which was poured into the cylinder in equal quantities night and morning. The effluent water, collecting in the earthenware tray, flowed off into a vessel conveniently placed for its reception.

The effluent water was analytically examined weekly, the sewage being always allowed to pass through it at least a week before the first sample was collected. The same rule was also observed whenever the rate of filtration was altered.

The first soil submitted to experiment was a very porous gravel taken from a field at Beddington, near Croydon, which had been under sewage irrigation for five years.

These results shewed how rapidly the process of nitrification (the conversion of ammonia and animal organic matter in nitrates) takes place in the Beddington soil, and how satisfactorily the sewage is purified even at the rate of 7.6 gallons per cubic yard of soil per diem. But when this rate was doubled the nitrification ceased, and the pores of the soil became blocked up so that they would no longer transmit the whole volume of sewage applied, and also afford time for aeration; for while, however, the organic matter, which otherwise have been oxidized, was re-

tained by the soil, and its oxidized products appeared in the effluent water a month later, after the rate of filtration had been reduced. The effluent water was always clear and nearly colourless at the rate of 3.8 and 7.6 gallons per cubic yard per diem. In respect of organic matter, the filtered sewage actually equalled, or even surpassed in purity on four occasions, the water which is sometimes supplied to London for domestic purposes.

The next soil experimented with was a light sand of bright red colour from the New Red Sandstone at Hambrook, in Gloucestershire.

The Hambrook, unlike the Beddington soil, had not been previously submitted to the action of sewage, and it is therefore not surprising that it should at first exhibit a somewhat irregular effect. Thus, it obviously contained a store of organic matter which was washed out by the first application of the sewage; hence the very large amount of organic carbon, organic nitrogen, and nitrogen in the form of nitrates and nitrites, contained in the first sample of effluent water. On the other hand, a large proportion of the common salt contained in the sewage was absorbed, and hence the reduction of the proportion of chlorine from about 10 parts originally contained in 100,000 of the sewage to 2.8 parts. It was only after the lapse of a fortnight that this absorption of common salt ceased, and the proportion of chlorine rose to 10.5 parts in 100,000.

The small amount of nitrates, nitrites, and ammonia, contemporaneous with little organic nitrogen, in the effluent water after the first washing out of the soil, indicates an absorption and retention of organic matter by the Hambrook soil. Nevertheless, this action must have been subsequently reversed, as the soil gave on analysis but mere traces of organic carbon and nitrogen. The possibility of such an absorption, and the extent to which it may take place in some soils, is seen in the remarkable results obtained in the next experiment made with soil from the sewage farm at Barking, which shew that there are soils in which the process of nitrification either does not take place at all, or goes on

with great difficulty. The Barking soil is one of these, and it moreover possesses the valuable property of absorbing a large amount of fertilizing ingredients from sewage. It is scarcely possible to overrate the agricultural value of this property in a soil which is destined for irrigation. This quality, however, greatly detracts from its efficacy as a continuous purifier of sewage filtered through it. The application of 3.8 gallons per diem to each cubic yard for about twelve weeks shewed a continuous increase of organic impurity in the effluent water, which at the end of that time was rapidly approaching in quality to unchanged and unpurified sewage.

The next soil submitted to experiment was a light yellowish brown loam from the marlstone of the lower oolite near Dursley, in Gloucestershire. As the former experiments were made in the warm atmosphere of the laboratory, and the soils in the glass cylinders were to some extent exposed to light, it was deemed advisable in this case to place the cylinder in darkness, and to expose it to all the vicissitudes of a winter temperature. The result proves that the nitrifying or purifying power of a soil is not interfered with by moderate cold or by darkness.

The analytical results shewed that the Dursley soil surpasses all the others experimented upon, in its power of purifying sewage. Whilst one cubic yard of sand or of Hambrook soil cannot continuously and satisfactorily purify more than 4.4 gallons of London sewage per 24 hours, one cubic yard of Beddington soil can cleanse 7.6 gallons, and one cubic yard of Dursley soil no less than 9.9 gallons in 24 hours, which is equivalent to the cleansing of nearly 100,000 gallons of sewage per day by an acre of this soil, provided the drains for the effluent water are 6 feet deep. Even when the rate of filtration amounted to 12.4 gallons per cubic yard in 24 hours, the sewage was greatly ameliorated, though not quite satisfactorily cleansed. At the conclusion of the long series of experiments there were no symptoms of clogging up or diminution of activity, and the effluent water was always bright, inodorous, and nearly colourless.

The cleansing power of a soil seems to be more closely connected with physical condition, as regards porosity and fineness of division, than with its chemical composition. Thus, the Beddington and Barking soils, whilst similar in chemical composition, are most widely dissimilar in their action upon sewage. Again, sand and Hambrook soil act very similarly upon sewage, whilst they differ considerably in chemical composition; and lastly, the Hambrook and Dursley soils do not differ very widely in their chemical composition; nevertheless, the latter has more than twice the purifying power of the former.

SEWAGE ON PEAT SOILS.

A large proportion of the waste land of Great Britain is covered with peat; it was therefore important to ascertain how this substance would behave with sewage. A sample of peat from Leyland Moss near Preston, which may be regarded as a fair specimen of Lancashire peat, was submitted to experiment. The peat was cut from a field which had been heavily manured with guano and farm-yard manure, and the analytical results shew that this dressing exerted a great influence upon the effluent water for the three first weeks of the experiments.

These analytical results shewed that, although the action of Lancashire peat upon sewage is for a couple of months but slight and unsatisfactory, yet the subsequent steady improvement of the effluent water encourages the hope that this material would, after a somewhat longer education, become an efficient purifier of sewage filtered through it at the rate of 4 gallons per cubic yard per 24 hours.

These experiments upon the filtration of sewage through various materials leave no doubt that this liquid can be effectually purified by such processes, and that probably any variety of porous and finely divided soil may be employed for this purpose. Our experiments also appear to shew that if the soil be not overdosed with sewage, it will retain its efficiency for a long, if not for an unlimited period of time, and its pores will not become clogged up. With a properly constituted soil,

well and deeply drained, nothing more would be necessary than to level the surface and to divide it into four equal plots, each of which in succession would then receive the sewage for six hours. In this way the sewage of a water-closet town of 10,000 inhabitants could, at a very moderate estimate, be cleansed upon five acres of land if the latter were well drained to the depth of six feet.

Nevertheless, there are three formidable objections to the general adoption of this process:—1st, It is entirely unremunerative, the amount of sewage applied to a given area of land being probably in such a case too great to permit of the growth of any ordinary agricultural crop. 2d, The whole of the manure ingredients of the sewage would be absolutely wasted. And 3d, The collection of solid faecal matters upon the surface of the soil with no vegetation to make use of them, would probably give rise to a formidable nuisance, especially in hot weather. We also entertain doubts as to the process being equally successful under ordinary management on a large scale, since the sewage would be likely to pass through the land in an unequal manner, in some places reaching the drains very rapidly, in others passing through the soil too slowly. This, we believe, to have been the cause of the comparatively partial purification of the Chorley sewage which in June last we

saw passed upon and through several acres of fallow land, roughly broken up. The analyses of the sewage and effluent water shewed that there was here no nitrification, and consequently but an imperfect purification of the liquid.

From all these experiments, then, it appears that the action of the filter must not be considered as merely mechanical. The process carried on in it is also chemical. Filtration, properly conducted, results in the oxidation and transformation of offensive organic substances in solution, as well as in the mere mechanical separation of the suspended solid matters which, when in motion, sewage conveys with it. If the process could be carried one step farther, and those harmless inorganic salts, which are carried off by the effluent water of a perfect sewage filter, in too dilute a solution to be profitably extracted, could be converted into something positively useful, the remedy would be complete. We should have succeeded in not only abating an injurious nuisance, but in realizing a product which would help to refund expenses. This farther step is possible in the great majority of cases, and it is to the plan of using sewage in irrigation, as being in reality a filtration of the best kind, *plus* a conversion of its filthy contents into valuable products, that we have now to direct attention.

[To be continued.]

CHEAP ROADS AND WALKS.

From "THE VILLA GARDENER."

ROAD-MAKING should either proceed with, or immediately succeed, the building of a residence. Possession should never be taken of a villa until the roads to and from it are finished. Even the chief walks in a garden or pleasure ground should be

desire for a walk grows into an irrepressible passion. Such is the perversity of nature ; and it is wisest in all these cases neither to excite nor provoke our feelings into lively exercise. To a delicate health the change of residence

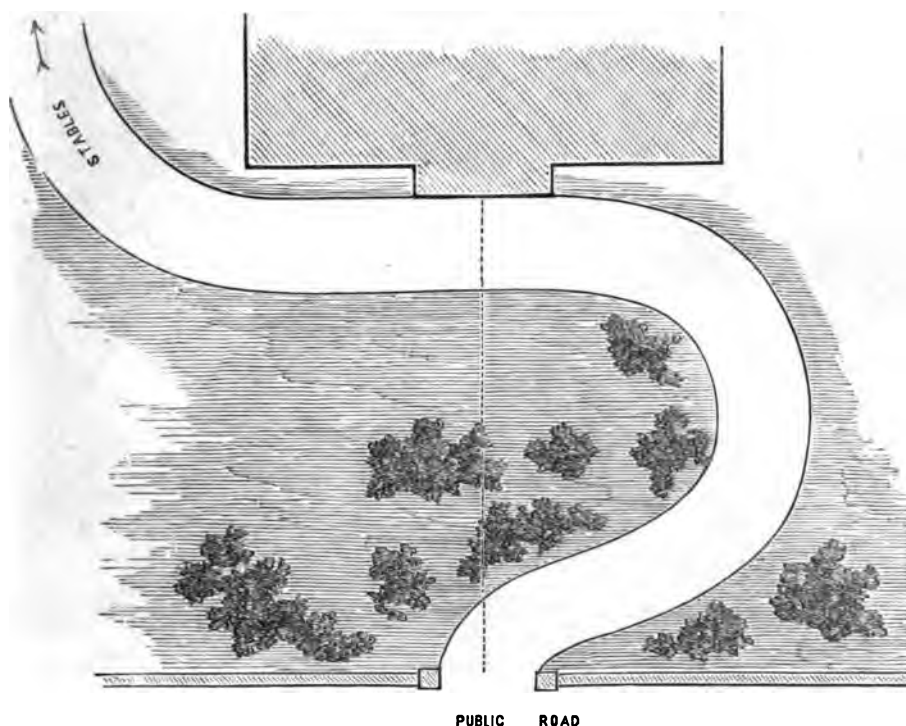


Fig 1.—Design for Carriage Drive to a Villa.

completed before, or as soon after the house is inhabited as possible. A whole chapter might be filled with the miseries of families imprisoned by the dirt and noise of such heavy and obstructive operations. People can sit in the house for days, and care little for exercise in the open air. But let our walks be blocked up, thoroughfares barricaded with men, horses, and carts, floundering about in mud and water, and the sufficient trial, without the noise and rattle and crash of road-making. also a great saving of labour and expense taking time and opportunity by the in such matters.

Generally in the building of houses of the best material for road-making mulated. First of all there is the removal of fences ; then there is the digging of foundations ; succeeded by the t

levelling, or forming of the grounds. All these processes are fruitful of road materials. On many soils sufficient hard elastic matters may be found on the spot to lay the foundation of all the roads and walks on the premises. It is no uncommon thing to see all this wasted and carted away as so much useless rubbish, and to see stuff not more valuable carted back again, for perhaps 5s. per load. Such a waste of labour and money reminds one forcibly of the nursery rhyme in

shrubbery. It is a ridiculous attempt at giving importance and the idea of magnitude to a property which it does not possess. Much better accept the semi-rural character of a villa residence at once, and make the road accordingly. Many, however, fall into the opposite extreme. Because their property is small, they do all in their power to expose its littleness, and offer up its seclusion as a free gift to the public. The villa stands, say 20 yards from

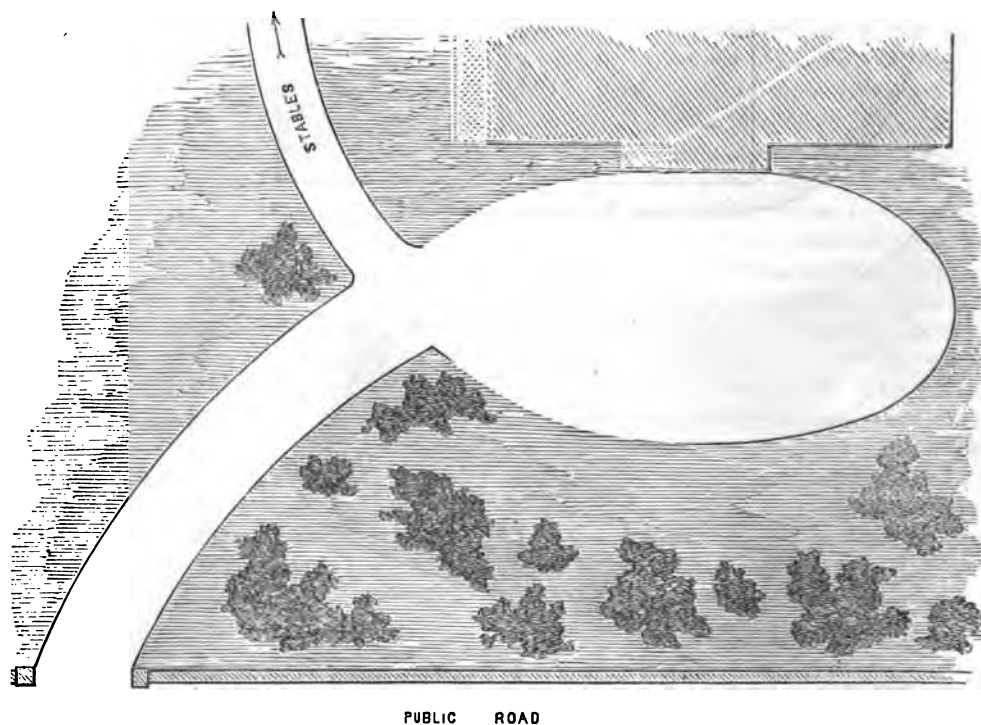


FIG. 1. Design for Carriage Drive to a Villa.

the public thoroughfare, and many make their carriage road wide and straight to the front door, as indicated in fig. 1, where the dotted line in the centre shews the straight drive to the house. The villa might almost as well stand by the side of the public road as far as any degree of privacy is concerned. Under such circumstances the following expedients may be successfully adapted to shut out the public eye.

On the other hand, many villa residences are so situated that they are almost inaccessible by the public thoroughfare, and many make their carriage road wide and straight to the front door, as indicated in fig. 1, where the dotted line in the centre shews the straight drive to the house.

The villa might almost as well stand by the side of the public road as far as any degree of privacy is concerned. Under such circumstances the following expedients may be successfully adapted to shut out the public eye.

Presuming that it is still needful to enter at the same gate, the road might diverge to the right or left and describe a curve in the direction of the door. In this principal case the space in front would be planted with a group of laurels, hollies, or other tall shrubs, and the public thoroughfare be thus effectively shut out from the doors and windows.

Another simple and effective arrangement is shewn in fig. 2. Here the carriage

size will form an impenetrable screen as soon as planted.

In most detached villa residences, stables are a necessity, and the road to these can diverge from the main entrance at any point of its progress. As the stable road also leads to the back door, it is better to diverge to it before reaching the front of the house. A very common, though most objectionable, arrangement is for the back or stable entrance

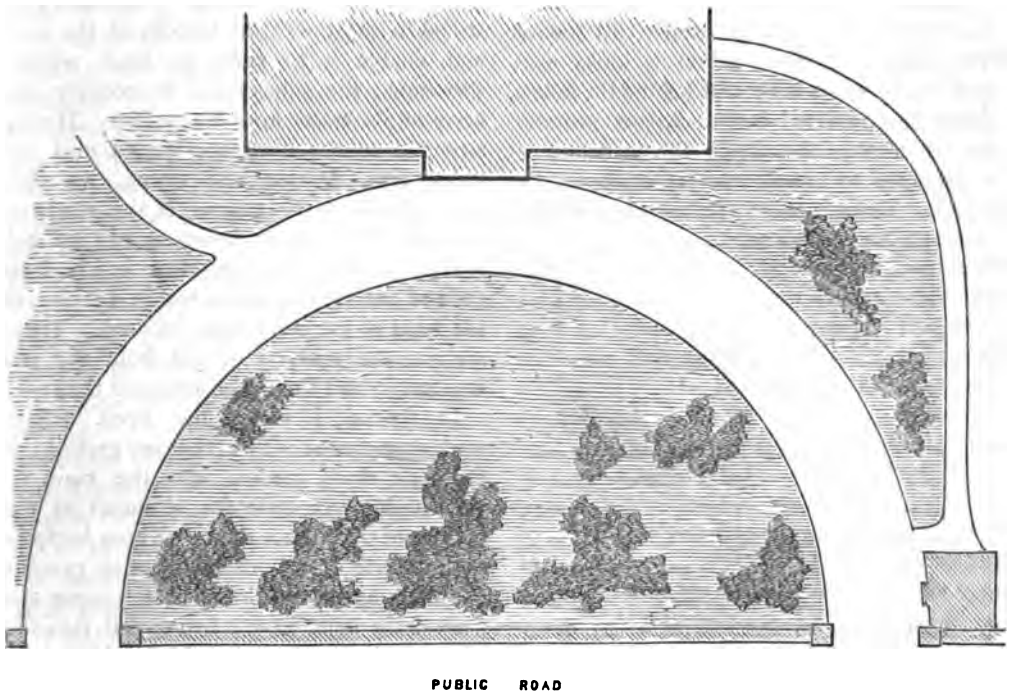


Fig. 3—Design for Carriage Drive to a Villa.

road enters before the house is reached, and the whole front plot, after allowing sufficient space for the carriage to turn in front of the door, is planted with a dense belting of trees and shrubs. This mode of shutting out the public eye is rendered much sooner completely effective by raising bold mounds of earth along the front, of from 4 to 6 feet in height, and planting cedars, pines, or tall shrubs on their face and summit. By thus elevating the root line, shrubs of the usual

to proceed round close to the house within view of the chief living rooms.

Another line of road is the double entrance one, as in fig. 3. At equal or unequal distances on both sides of the villa, the road enters and sweeps round a curve to the dwelling house. This is a useful and convenient arrangement, possessing all the advantages of the last. The only objection is that it involves double expense for road making and gates. A semicircle suffices to

form the lines of road in this arrangement, as shewn in the figure.

The particular form of the ground in front of the door is a matter of taste. The vital point in the matter is to allow sufficient space for a carriage and pair to turn round without running on to the grass. A very common mode, which saves gravel and other road material, is to have a round, elliptical, or even a square piece of turf in the centre of the space, and to carry the road round it.

Some again prefer a square of gravel in front, others a circle or ellipse, all gravel. The centre of grass, however, looks well, and, where space is limited behind the house, might be converted into a croquet ground; the chief objection being the intrusion of unexpected or unwelcome visitors upon the players. The minimum of clear space should

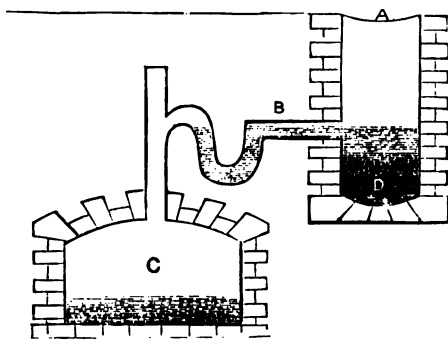


Fig. 4.—Section of Surface and Main Drains.

be from 12 to 18 feet. The width of the carriage road should be regulated by the size of the demesne and the length of the road. Twenty-five feet makes a noble roadway, and no carriage-way should be narrower than from 15 to 20 feet.

Having decided on the line of the road and its width, the next point demanding attention is the foundation. We begin house building by digging down; the same order is followed in road making. The earth over the whole surface of the roadway should be dug out to a uniform depth of 10 or 12 inches. It must be borne in mind that this earthy base has to support the road material, and the roads that travel over them; and therefore attention must first be given to making the bottom strong enough to carry

the burden of both. For this work, dry earth is strong, wet earth is weak. We must, therefore, strengthen the base of our roads by laying them perfectly dry. The easiest mode of doing so is to dig a drain down the middle a foot wide and 20 or 24 inches deep. Place a 3-inch drain tile in the bottom, and fill up to the top with rough stone. At intervals of 20 or 30 yards, small drains should proceed at right angles from the centre to the sides, and 14 inches under the excavated surface. The main drain is laid to dry the earthy bottom of the road, and enable it to carry its load without shrinking; the side drains to receive and carry off the water from the surface. Having attended to the deep foundations and laid them thus, durable and strong, we shall next proceed to the making of the roadway. Previous to doing so, however, run up hollow brick pits, 9 inches clear inside, from each of the side drains, to within 3 inches of the level of the road when finished. These are for the removal of grit from the surface water, and should be arranged thus:—

In fig. 4, A shews the brick framework surmounted with a concave grating; B the side drain leading into the main C; and D the receptacle for sediment at the bottom of the surface drain. These bottoms should be frequently cleaned out to prevent the filling up of the drains. Of course, the main drain must have a free outfall into the roadside ditch or sewer. If the latter, the exit should be trapped to prevent the inlet of foul odours, or of rats. The earth excavated may be used on the spot for forming such banks for shrubs, &c., as we have recommended. Here then is a clear space, with all the requisite lines of beauty and convenience. How is it to be filled up? Close by lies a large heap of thorn bushes, the remnants of a miserable quickset hedge. Let us begin with them. "What, make a road of such perishable stuff?" Yes, why not! Do you want a noiseless elastic road as different as can be from the din, rattle, and roar of the city streets? Well, we should like that! Then we must begin with a yielding material, something that will bend

its back to the burden, and spring up again when the burden is removed. These faggots, in fact, will give a springiness to the road which nothing else can impart. We will, therefore, lay them carefully on across the road, so thickly as to form about 4 inches. After this layer is finished, the smallest twigs are laid on the top, and over all, a thin coating of wheat straw is placed as a wall of division between the wood and the stone. Then follows 4 inches of broken granite, about 2 or 3 inches square, forming the back bone of the road. This is the best material; but any kind of stone, flint, or even brickbats, or very coarse gravel, will answer the same purpose. This layer must be hard, and of a pretty uniform size, reserving, however, the smallest stones for the top. For the surface, asphalté, concrete, compounds of tar and ashes, or tar and stone or gravel, have been employed with more or less success. The best roads we have ever seen of this class were surfaced with tar and red sandstone rock, broken down to about the size of large peas. After it was nearly dry, another coating of sand was rolled in, and the surface resembled that of a sandstone rock, mottled with fragments of jet. But most of the compounds formed of tar, and even asphalté, are apt to break up with frost, to smell badly in the sunshine, and to look dark and dreary at all seasons.

I make a present of all such surfacing to town folks in towns, and demand for villa roads a furnishing of bright red binding gravel. Take note of the word *binding*. There are gravels *and* gravels, through an endless series, ranging from utter worthlessness to a value approximating to that of rubies. Be sure, then, to obtain the best for your carriage road; it will prove by far the cheapest in the end: a coating of 3 inches in thickness will suffice. Let it be raked level, and immediately rolled firmly down. I forgot, however, to say that the stones ought to be well rolled before the gravel is put on. This settles the faggots, smoothes the upper surface of stones, and also hinders the gravel from being lost among them. Roll and re-roll the gravel with a heavy horse roller.

The less traffic on the new road the better until it has had a good soaking of rain. This will wash it bright, and exert a great consolidating force. As soon after as a roller can be used without the gravel sticking to it, roll it again, and keep on rolling until neither the roller nor a carriage wheel make any sensible impression. After every rain, repeat the rolling until the surface is almost as smooth as glass, and nearly as hard as iron. This hardness will improve its appearance, and make it almost water-proof; while it will preserve it from the pest of weeds. The less water that passes through a roadway the longer it will stand. The gratings should remove all surface water; and roads made as here directed, hard and smooth above and dry below, will last good, with but little attention, for a whole generation.

As to the form of the surface, some recommend a dead level; but a slight degree of convexity tends to preserve the road, and does not detract from its beauty. Roads 20 feet wide may have a rise in the centre of $1\frac{1}{2}$ inch. In very wet situations, roads are occasionally made very much raised in the middle, and above the normal level of the ground. Such roads are not adapted for approaches to villa residences, as they have a bold, prominent appearance that is anything but pleasing. The surface of finished roads should either be level with, or 1 inch, at the most, above the surrounding grounds.

Possibly we may be expected to add a word or two upon the external and side boundaries of roads—that is, gates and edgings. The best of all gates are those made of iron, of chaste and simple designs. Villa gates should never affect massiveness nor grandeur. It is the most vulgar taste to have heavy bronze gates, of the most elaborate patterns, leading to a sort of architectural *bandbox*, in the form of a snug rural villa. Where the house has to be very close to the public road, close doors of wood or iron are preferable to gates, as securing greater privacy. Close barriers to the end of the roads are also of service as wind-breakers in exposed localities. The wind may be planted out at other points, but it

may rush up a carriage entrance with such force as to threaten the windows, or even the house itself. As to edgings, first and best of all is grass. Iron, wood, stone, earthenware of all qualities and patterns, may be used with more or less propriety elsewhere, but should have no place on villa roads or walks. These should have as little of the town and as much of the country about them as possible. The tired merchant or tradesman, as he shuts his villa gate, should enter into a morsel of country, and not see another edition of the town, done in wire, stone, or tiles, along his pathway. Where grass will not grow, ivy, periwinkle, thrift, box, or other plants will. The great essential is to have green edgings to villa roads and walks. A very cheap and common mode of edging paths under trees is to place a row or two of large flint or other stones, fill up with earth behind or among them, and plant with periwinkle or ivy.

These remarks upon road edgings are equally applicable to those of walks. In fact, walks are but contracted roads, and roads may be defined as walks grown large. The latter carry lighter weights, and therefore the foundations need not be laid so deep. It is well, however, to lay them in the same manner if they are to be permanently enjoyed. Few arrangements contribute so large a share of enjoyability to a garden, large or small, as good walks. Once well made they may be said to be made for ever. An ill-made walk is always bad, and never fit for use when it is most needed. The substance of walks should range from 4 to 8 inches in thickness, the former being the common depth on dry, chalky, rocky, or gravelly beds; the latter being a fair average. They may be made exactly the same as roads, or the elastic bottom of faggots disensed with.

The proper width of walks is important. It should be as narrow as the rule; but may range from 10 to 20 feet in width, the average for villas being from 3 to 4 feet. The main walk should be less than 4 feet. It needs this breadth to enable two to walk abreast comfortably and one might almost

as well go to the treadmill as seek for pleasure in walking up and down in single file. Narrow walks look mean and poor as well as prove uncomfortable. Concretes of lime and gravel—one portion of the former to five of the latter—do better for walks than roads, as there is no heavy traffic to cut them up into shreds; and anything hard will do for bottoming, such as clinkers, brickbats, old

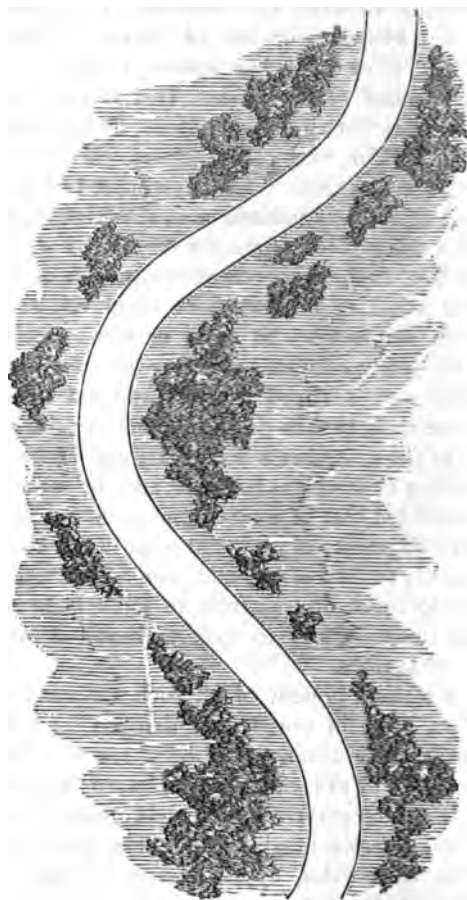


Fig. 5—A Walk with bold Curves.

plaster, chalk, or even ashes. Such substances as stones may constitute the major portion of the body of the walks; then roll or ram firmly down, as with roads, and dress off with 2 or 3 inches of bright red gravel.

I have stated, I think, that a carriage-road should either be, or appear to be, a direct route to the house. The same rule, with many exceptions, will apply to walks in a

Cheap Roads and Walks

large place and on an extensive scale. It may, however, be set at defiance in villas. Here the most pleasant walks may be allowed to go the farthest way round. The problem to be solved is the providing of the greatest length of walk in the smallest area. It is bad taste to have two walks parallel and close to one another. But the rock a-head in walk-making in villa gardens is straightness. It can plainly be seen, but even so it is most difficult to avoid, for all things are straight. The walls of the house, the boundary fences, the road outside, why not the walks? Well, just for the best of all reasons, that town folk have too much of the straight line, and that a bend is a relief, and herein consists another danger. The diversion from a straight line is often so extreme as to present a dreary monotony. Doubtless city men find a relief in curves. But a monotonous repetition even of such lines of beauty, especially if always the same, fail to please. Therefore, the utmost variety must prevail. They should be as bold as the size of the ground will permit: it being infinitely better to have one walk sweeping along to all points of interest, in bold curves (see fig. 5), than to have two or more in a zig-zag fashion.

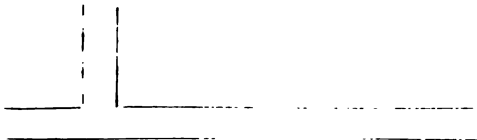


Fig. 6.

Another point of the utmost moment is the planting of shrubs or trees in the line of the walk, so as to satisfy the mind that it is necessary for it to bend just there; and

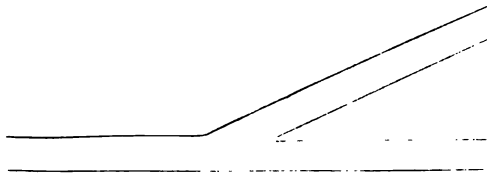


Fig. 7.

so it is a rule of the highest art that no lines should be made without satisfactory reasons. Such perfection cannot always be reached in walk making; but the remembrance

of the rule may save the villa garden many ridiculous blunders in plan the best way round. The line of diverge

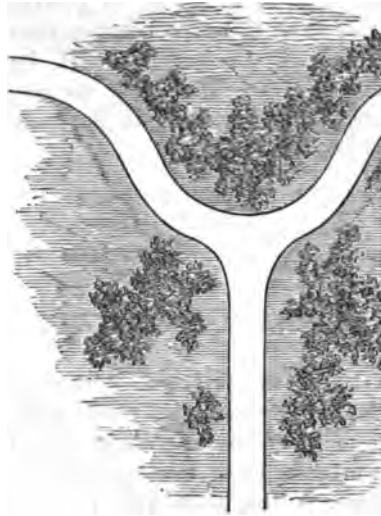


Fig. 8.

walk from another is important. Sometimes this is at right angles (fig. 6), which is

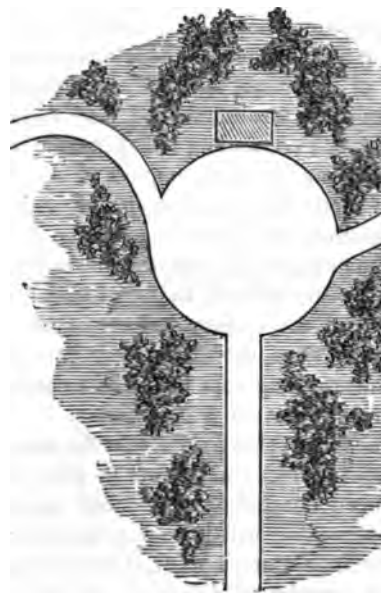


Fig. 9.

for straight walks. A more common is to diverge with an angle more or less as in fig. 7. Sometimes a walk diverges

a bold curve, as in fig. 8, and proceeds in two directions. Again walks often terminate at a tree, seat, or other object, and branch walks diverge from these, as in fig. 9. A general rule applicable to all these secondary matters is that the line of divergence should be thorough and decisive, and shew no tendency at starting of returning to the walk which it has just left.

The introduction of artificial waterfalls, rocks, &c., furnish rare opportunities for lengthening the distance and increasing the interest of walks in villa residences. But these belong to laying out the garden rather than the walking round it; and we hope, from the above remarks, that our readers will find the way out of and into the villa, and all around it, plain and smooth, clean and dry.

THE CONSTRUCTION AND REPAIR OF ROADS.

ALTHOUGH the principal portion of the inland passenger and goods traffic between all towns of any magnitude, and all localities of manufacturing, mining, and trading importance, is now by railways, the property of joint stock companies, yet the turnpike roads, and the township, and other highways, will continue to be of great interest and importance to the rural community of the kingdom.

The ordinary road communications throughout the kingdom, and which, little more than a quarter of a century ago, ere the present system of railways was established, were those alone in use, still continuing indispensable to the requirements of the occupiers of land, the state of such communications having great influence on the value of landed property, and the cost of maintaining the public highway still continuing, as heretofore, to be chargeable upon the land, the owners and occupiers of landed estates have therefore every interest in the highways being kept in the best condition, and repaired at the least expense.

It may be taken as an axiom, that the more completely a road is constructed, the more easily it will be kept in repair. When a road is in a bad state, it is none the less a difference of opinion as to what constitutes a good road, it is not a matter of general agreement as to the best method of maintaining that end. This arises from frequent igno-

rance of the correct principles on which the goodness of roads depends; and it is with a view to point out, for the benefit of those it may concern, such principles of construction by which so desirable a result as the attainment of good and easily maintained roads, that the following brief tract has been undertaken.

DRYNESS OF SOIL ON WHICH A ROAD IS CONSTRUCTED THE FIRST ESSENTIAL TO ITS GOODNESS.

A road to be a good one and easily kept in repair, must have the soil on which it is made of such a nature as to bear the weight of any traffic brought upon it, without any shrinking or displacement of its particles. The soil should, in fact, constitute the road, and the covering should only be considered as a hard and tough matter, interposed between the weight of the traffic and the road to support it, to protect the latter from abrasion of its surface by the motion of the former; that is, for the same purpose that a thin sheathing of hard metal is frequently used as a covering for wood, or any soft material of sufficient strength for its purpose, to protect such wood or other material from injury, by the friction of a heavy body in motion upon it. A road, to be considered good, should not, in any degree, be dependant upon the covering of stone for supporting the weight of the traffic upon it; otherwise no thickness or goodness of the material of the covering will prevent the soil of the road

working through it ; and thereby speedily becoming into a ruinous condition.

The soils most liable to work through the stone covering of roads are wet clays, particularly blue gault or drift clay, wet or loose sands, wet peat soils, and bogs or mosses. In fact, any soil containing stagnant water is incapable of bearing the weight of traffic upon it; and any road made upon such soils will rapidly be out of repair, however thick and good its stone covering may be. The first thing then to be done in road-making is to have the site of the road thoroughly drained, if the soil contains stagnant water.

Although dryness of soil in which a road is made, is the first essential of its goodness, yet there are many other properties equally important and necessary to be attended to in its construction. The properties alluded to will be separately discussed in the following pages of the present treatise.

THE FORM OF ROAD IN THE DIRECTION OF ITS ROUTE OR LEAD.

For safety in descending, and economy in conveying traffic in ascending hills, as well as in maintaining roads in repair, steep gradients in the route of roads should be, as much as possible, avoided.

The greatest portion of travelling, and also of heavy traffic in the conveyance of goods having been transferred from common roads to railroads, there may not be, at the present day, the same reasons for having roads without steep gradients—either for the safety of persons, or for the saving of animal labour in the conveyance of goods—as there was in former times; yet as common roads are still used to a considerable extent for travelling in vehicles drawn by horses, and moving at a considerable velocity, and also for the conveyance of bulky and heavy loads, the limit of safety in the gradient should be by no means disregarded, either in designing and laying out a new road, or in altering the direction of an old one. The limit referred to is such, that the gradient, in attaining a height to be passed over, shall be such as to be safe for carriages travelling at an ordinary speed. The ascent must be so limited that

the friction of the carriage shall overcome an accelerated velocity in descending an incline. This limit may be ascertained by the force required to produce and maintain motion in a carriage on a level road. In this the weight of the carriage will be proportional to the base, and the force required to produce and maintain motion of the carriage to the height of the inclined plane down which the carriage may descend without accelerated velocity. The angle of inclination which will produce an equilibrium between the friction of a carriage and the force of gravitation, to produce accelerated velocity, is called the *angle of friction*, and it varies in roads of different construction and materials. *The rate of inclination of the angle of friction* is the proportion of 1 to the quotient, arising from dividing the weight of a carriage by the force required to produce and maintain its motion on a level road.

The force required to produce and maintain motion of a carriage weighing 1 ton has been ascertained by the experiments of Mr MacNeil, on roads of different constructions and materials. These, and the resulting rates of inclination of the angle of friction, are given in the following table :—

Description of Road.	Force of Friction on a Level. lb.	Rate of Inclination of Angle of Frict.
1. Well made pavement	33	1 to 86
2. Broken stone surface or old flint road	65	1 to 35
3. Gravel road	147	1 to 16
4. Broken stone road, on a rough pavement	46	1 to 50
5. Broken stone surface, on a concrete bottom formed of Parker's cement and gravel	46	1 to 50

The results in the foregoing table are the *maximum* rates of inclination to ensure safety in travelling in descending incline planes in the direction of public roads; but another, and scarcely less important consideration in laying out a public road, is economy of the labour of the draught cattle.

The absorption of power in ascending inclined planes is shewn by the following table, copied from article "Road," in Morton's "Cyclopædia of Agriculture," in which a com-

parison is given of increased distance as an equivalent of that on a level road, as due to the vertical height of various slopes of different rates of incline :—

Rate of Incline.	Angle with horizon.			A level road being equivl.
	d.	m.	s.	
1 in 500	0	6	53	1.102
1 in 400	0	8	36	1.128
1 in 300	0	11	28	1.170
1 in 200	0	17	11	1.255
1 in 100	0	34	23	1.510
1 in 90	0	38	12	1.566
1 in 80	0	42	58	1.637
1 in 70	0	49	7	1.728
1 in 60	0	57	18	1.850
1 in 50	1	8	6	2.019
1 in 40	1	25	57	2.274
1 in 30	1	54	27	2.699
1 in 20	2	51	21	3.538
1 in 10	5	42	58	6.067

So much for the effects of inclined planes in the course or direction of roads, both as to the safety of travelling in wheel carriages in descending, and as to the economy in the labour of draught cattle in the conveyance of loads up

the ascents of inclined planes. The last matter for consideration on this topic is, the effect of inclined planes in the direction of roads, on their maintenance in repair, and on their durability.

Whoever may have made any observation on the state of a road upon an inclined plane, compared with that on a level, will not have failed to discover that in proportion to the steepness of the incline, the materials of the covering of roads is more liable to become loose and be displaced, from whatever cause such loosening and displacement may take place. When the incline is so steep as to require that the friction of a carriage descending upon it be increased by the use of drags, skids, or brakes, to compensate the force of gravitation in producing accelerated velocity, the dragging or sliding action of the wheels occasions great amount of wearing in the covering of the road, and a much greater amount and cost of repair of the road than when the incline is not so great as to require recourse being had to such expedients.

Farm Architecture.

HOME TIMBER FOR BUILDING PURPOSES.

IN an article recently given we offered some remarks upon the points referring to the period at which timber trees should be felled. We now proceed to the *seasoning* of the felled timber. This is a department in the management of home timber of which it is impossible to overrate the importance, yet one which is frequently neglected, and concerning which many erroneous notions are afloat. Before proceeding to the description of the practical methods in use, it will be of some service to our readers if we glance at a few of the points connected with the natural peculiarities of timber trees, bearing upon the practice of seasoning.

There is considerable difference in the natural properties of wood. This difference is attributable partly, to the physical construction of the fibre, or "lignin," and partly to the nature of the sap which has nourished it whilst growing. The physical construction of the fibre includes not only its form, but its substance also. This point is important, inasmuch as the evaporation of the watery portion of the sap of the wood, which is vitally necessary, is either facilitated or retarded, according as the fibre is open and spongy, or close and compact. And again, in woods where the fibre is close and compact, such as oak, beech, &c., the proportion of sap to fibre is much less than in the more open and spongy woods, such as fir, willow, &c.

But although the porosity of wood is important, as being the medium of evaporation, the nature of the sap is a point of greater importance, for the following reasons:

When a tree is cut down, it is charged with that quantity of natural moisture which has been necessary for its vegetable existence. Now, it is an established physiological fact,

that the very moisture which has been necessary for the perpetuation of either vegetable or animal life becomes converted into a primary element of decay and decomposition the moment that vitality ceases. The verification of this fact is simple and conclusive: remove the natural moisture from either vegetable or animal matter, and you effectually protect it from decay.

The second cause of the difference in the properties of wood, before alluded to, is the nature of the sap which has nourished it whilst growing. It is scarcely necessary to state that the sap of all trees is not alike. This difference is caused by the various proportions of different chemical substances which enter into its composition. For instance, the sap of some trees is more or less resinous, as that of the pine; gallic, or astringent, as that of the oak; or mucilaginous, as that of the cherry tree; and according to the increased proportion of these substances which the sap contains, there is less liability to rapid decay; whilst, on the contrary, the more water the sap contains in its natural state, the less durable is the wood when deprived of vegetable life.

The decay of wood of all kinds dates from the time that its vegetable life has been destroyed by cutting down. From that moment the work of decomposition begins, and is expedited or retarded according to the nature of the wood, and the length of time that may elapse before the watery portion of its sap is evaporated. If, then, such moisture is allowed to remain, decay soon becomes perceptible; but, on the contrary, if it be expelled, the process of decay is so slow, and so gradual in its operation, as to be imperceptible for centuries in some descriptions of wood, and

hence the necessity for using well seasoned wood.

The chief cause of decay in wood is the fermentation of the nitrogenous substances contained in the sap ; this fermentation being developed under the influence of the action of the oxygen in the atmosphere with the moisture in the wood.

Such is the generally received opinion as to the cause of its decay. We have now, however, to add to these remarks a brief notice of the researches of the celebrated Continental chemist and physiologist, M. Pasteur, which throws a new light on the subject. The researches of M. Pasteur, who is well known as the opponent of the theory of the self-germinating power of matter, convinced him that the decay of wood was owing to the presence in its pores of infusoria, or organized beings of an extremely minute, or, as may be said, ultra-microscopic character—these organizations being found in the air, and thence proceeding to the pores of the wood. Of these, one species possesses the power, in a remarkable degree, of condensing oxygen upon their surfaces. These infusoria are known as “bacterinias;” the infusoria which succeed them, and known as the “vibrions,” appears in a medium deprived of its oxygen. In an experiment instituted by M. Pasteur, he placed in a flask, previously heated to a red heat, to destroy all the animal germs, 10 grammes of oak sawdust, previously subjected to a temperature of boiling water, with some water. The mixture was kept at a temperature of 90 deg., and after being exposed thus for the period of a month, the sawdust had absorbed but a few cubic centimetres of oxygen. But in the case of humid sawdust placed in a flask, and both under the usual atmospheric conditions—that is, not previously subjected to high temperature—M. Pasteur found that after an interval of fourteen days only, that the mixture had absorbed no fewer than 300 cubic centimetres of oxygen. On the first examination of the second product there was nothing apparently present which was likely to give rise to this difference between it and the product of the first

experiment ; but on examining the second product with a microscope, M. Pastura found the surfaces of the saw-dust covered with the spores of infusoria. He, therefore, comes to the conclusion, that it is to the presence of those minute organizations in the pores of the wood that wood decays, and that three conditions tend to their rapid development—stagnation of the air, humidity, and elevation of temperature.

Before proceeding to describe the plans of seasoning or preserving wood—for the two terms in a certain sense are synonymous, as wellseasoned wood will be preserved—founded on the theories there named, we shall glance at the methods in general use. And first, as to the seasoning by “immersion in water.” This plan proceeds upon the principle that, by lying in water the sap is washed out of the pores, and the water takes its place, which, when the timber is afterwards exposed to the atmosphere, is much more easily and quickly expelled by evaporation from the timber, than the sap in its ordinary or natural condition. To obtain these results in the quickest way, two things are essential, the placing of the timber in running water, and the highest degree attainable of purity in it.

Where strong peat or moss water can be had, it may be used advantageously to preserve or season wood in small pieces, such as those used for fences, and the like purposes. Mr J. L. Morton, in one of the Prize Essays of the Highland Society, On the Preservation of Timber, explains the most suitable mode of conducting the process as follows :—

Select a part of a peat-moss where, at some depth from the surface, the deposit is of a strong dark colour. Dig out a pit of the required size, deep enough to reach the most compact layers of the peat, and remove as much of the surface material as will permit a ready access to the tank so formed. From the surrounding peat, water will soon ooze out, and a pond will be formed, which, however, should not be allowed to become more than 4 or 5 feet deep, an overflow ditch being provided to regulate the depth. Into this water the dried posts, or other wood material requiring to be saturated, may then be placed, and as they are being put

in, some powdered lime should be thrown over them, and mixed with the water. The principal object in using the lime is to promote to some extent the liberation of the ammonia which may be present in the peat water, and to impregnate the surface of the wood as to prevent the seeds of fungi from striking root upon it if it is to be placed in a dry situation, and, to a certain extent, from rotting if in a moist one. If allowed to remain immersed in the peat water for six months, the wood will then be found greatly increased in durability, and though discoloured a little, this is no great disadvantage for coarse purposes. Should the water be drawn off during the time the wood is in the pit, and a new supply allowed to collect in its place, the efficiency of the process will be promoted. In this case, a little fresh lime must be again mixed with the water, and the wood should not be left dry longer than is absolutely necessary. Of course it is only with such light wood, worth as small post "stobs," or rails, that are in a tolerably dry state, that this cheap process can be expected to succeed; but with these it will be found deserving of attention, when the existence of peat-moss supplies the facilities for it. With gate posts, and posts for wire-fencing, much more than six months' immersion is necessary to secure thorough saturation; but when the wood is of considerable value, as such posts usually are, it would certainly be advisable to charge the pores with creosote in Bethell's process, as will afterwards be described.

Where estates are in the neighbourhood of the sea, the timber has been recommended to be seasoned in the sea water; but although the seasoning is successful, still it is obtained at considerable disadvantage, as the timber exposed to the action of the sea water is much more difficult to work under the tools, and is, moreover, subjected to the atmospheric changes which bring out the dampness occasioned by the presence of the salt particles left in the pores.

Natural seasoning may be simply described as the placing of timber in such a way that, while secured from rain, snow, and sources of annual damp, it is freely exposed to currents of air. This of course implies the use of covering sheds; and the timber should be piled in such a way that the whole be dried as uniformly as possible, for it is found that when the side of a piece is dried more quickly than another, it warps. The shortest period to which timber should be exposed to natural seasoning is two years, and the process is judged to be pretty complete if the timber

loses one-fifth of its weight. Another precaution to be taken in carrying on the process, in addition to that named above, is not to expose the timber too soon to the drying process of currents of air, more especially if the weather is very warm and dry. In this case the timber should only be partially exposed to the air; and this may be best effected by piling the planks pretty closely together at first, gradually widening the spaces between them as the process proceeds. It is scarcely necessary to add that, however roughly the drying shed may be completed, a roof sound and weather-proof is absolutely essential. The notion is altogether an erroneous one, that timber can be seasoned by simply exposing in racks, as in timber and builders' yards. Exposed to all kinds of weather, the timber, in place of becoming seasoned, becomes really deteriorated in value. To test this in the most practical way, let timber which has been properly and efficiently seasoned, and therefore in good sound condition, be placed in open racks, a very short exposure to the atmospheric changes will rapidly deteriorate its value. As in the cutting down of timber, and sawing it into lengths, &c., a large amount of saw-dust, chips, &c., is accumulated, the best way of economizing this otherwise waste of material would be to erect some simple form of furnace in which it might be consumed, connecting this furnace with flues passing through the shed in which the natural seasoning was being carried out. This would greatly aid the seasoning. The following is the description of a method of seasoning wood in a rough way by the combustion of waste substances:—

On a piece of dry ground range a number of stones loosely together, round a circular open space about 3 feet in diameter. Into this vacant space, a gap or two should be left amongst the stones to admit sufficient air to the fire, which is to be placed in the centre. The superficial breadth of the ring of stones must depend on the quantity of timber that is to be dried at once, but, in general, 3 feet will be enough, its height from the ground being about 30 inches. In the centre a quantity of coal or refuse wood is placed, and on the loose stones all round, the wood to be dried is next placed diagonally, in such a way that the apex of the heap is

over the fire place. The wood being thus loosely arranged, the fire is kindled, and if the stones all round are as open as they ought to be, the smoke will soon find its way through every part of the pile. Care must be taken of course to leave a large enough opening in the centre to prevent the fire from catching any part of the surrounding wood; and if a sooty exterior is objectionable, coke or wood-charcoal may be used to generate the required heat. As the fuel of the first charge is consumed, another supply may be introduced by the air-vents till the whole wood that is being dried is deprived of its moisture. In a few days it will be found sufficiently dry for ordinary coarse constructive purposes, or for being impregnated with the preservative materials. For roofing and fencing spars, there can be no objection to the use of wood or coal fuel in its raw state. Assum-

ing that the trees are subjected to this drying process in the state they come from the plantation (in the case of home-grown timber), any blackness communicated to the outer surface, disappears in the slabbing and sawing up into sizes. . . . If the weather is dry and warm, the evaporating action of the fire will be increased; but in wet weather the process can scarcely be undertaken in the open air with advantage. The fire should not be too strong, for, in that event, the inside pieces of timber may be scorched and wasted. In most cases it will be advisable to reverse the sticks once during the operation, so as to season the whole alike. Wood, such as posts, rails, and other light coarse material, dried in this way, and then steeped in peat water, as described in a previous page, for a month or two, will be found to resist decay in a very satisfactory manner.

COVERED SHEDS FOR FARM-YARD MANURE.

IN continuation of our remarks upon the construction of covered dung sheds or pits, we have to state that the floor should be laid out so that the drainage will naturally flow to one point, and that point should be immediately above the liquid manure tank.

The best way to make the floor is indicated in fig. 1, where it is shewn as sloping from the

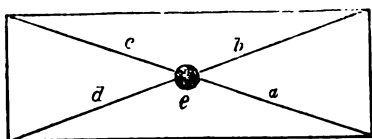


Fig. 1.

four corners of the rectangular pit, as $a b c d$, to the point e above the liquid manure tank. Fig. 2 is a section of this. Where the manure pit has not an underground liquid manure tank attached to it, as in the case of the covered

ferred concrete as the best material for making the floor; but where the carts which empty and fill the dung pits are not allowed

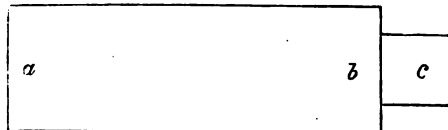


Fig. 3.

to enter it, a cheaper floor may be made, as of puddled clay, at least 9 inches thick. This, if well executed, will give a floor which will last for a long time.

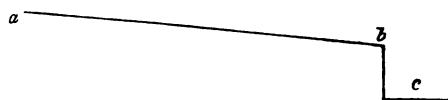


Fig. 4.

When a liquid manure tank forms part of a covered dung pit, means should be taken not only to deliver into it the liquid which passes from the manure in the pit, but also the liquid from the cattle stalls, stables, &c. The liquid which comes from these should not be allowed to pass at once into the tank, but should be made to deliver into a small or subsidiary settling tank, as c in fig. 5. The use of this is ob-

When a liquid manure tank forms part, it should always form a part, of a covered dung pit, means should be taken not only to deliver into it the liquid which passes from the manure in the pit, but also the liquid from the cattle stalls, stables, &c. The liquid which comes from these should not be allowed to pass at once into the tank, but should be made to deliver into a small or subsidiary settling tank, as c in fig. 5. The use of this is ob-

vious, the sediment contained in the exuviae passing from the stalls, stables, &c., settle in this small tank, from which it is easily removed by taking off the stone cover with which it is supplied. The overflow from the

dung in the pit *a*, from above the man hole, fig. 5. But as this is a tedious operation, and one, indeed, which should not be required, we prefer in our practice to adopt the arrangement indicated in fig. 5. In this a 9-

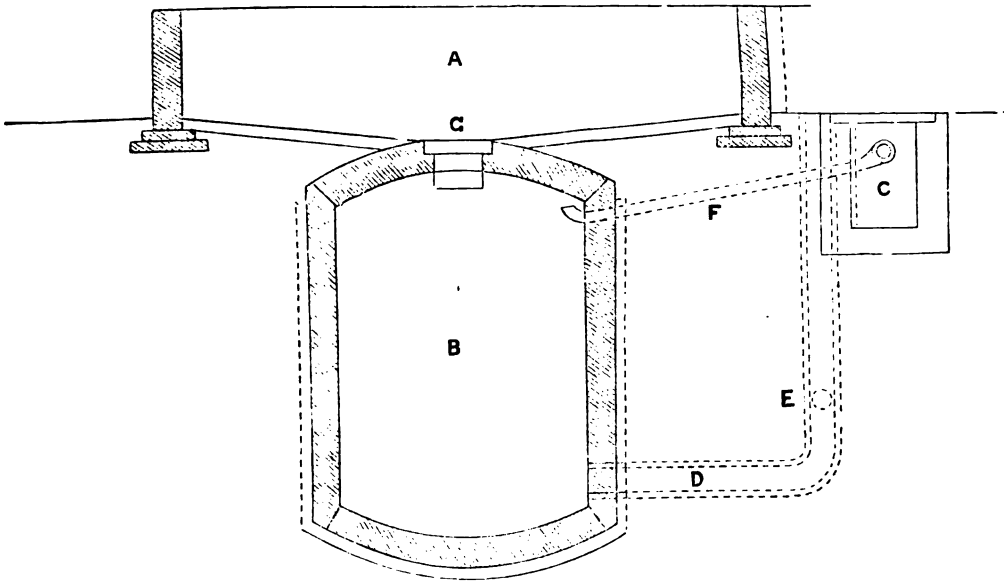


Fig. 5.

settling tank passes away by the pipe *f* to tank *b*. The liquid manure from tanks is as easily withdrawn from them by taking off the cover from the man hole at the top and inserting the pump barrel in the same. This arrange-

ment is good enough in cases where the tank is external to the dung pit; but where the tank is placed—as it is best placed—in the centre of the dung stance, as in fig. 5, it is not applicable, or only so by removing the inch drain tube, *d*, is connected with the lower part of the tank, and carried up, as at *e*, to the level of the ground where its aperture is closed with a stone cap. The liquid remains in the tube *d* *g* at the same level as in the tank; and by inserting the pump barrel in the long part of the tube *e*, the liquid can be removed at any time. We prefer the pump to be a fixture, passing through a circular aperture in the stone cap of the tube *e*, and the pump itself to be worked from a platform, of height sufficient to allow the liquid to flow into the liquid manure cart. The tube *e* opens up at the ground level, a little to the side of the settling tank, as indicated by the diagram in fig. 6, where *a* is the settling tank, *b* the position of tube.

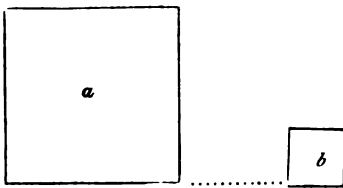


Fig. 6.

ment is good enough in cases where the tank is external to the dung pit; but where the tank is placed—as it is best placed—in the centre of the dung stance, as in fig. 5, it is not applicable, or only so by removing the

instant of reversal, both in the case of the
ve and of the main piston. The engine
rks direct on the pump. Perhaps the best
y to give an idea of its compactness is to
e the dimensions of one example. The
nch engine occupies, with its 5-inch pump,
ly 4 feet in horizontal length, and in height
ly 13 inches over two-thirds of this length,
: pump standing vertically 2 feet 8 inches
or the remainder. Worked with a 4-
se power boiler, with about 50 lb. of steam,
; engine will raise continuously 5440 galls.
water to a height of 30 feet or more per
hour. The useful applications for this steam
pump would be the supplying of tanks or
reservoirs, to yield a supply of water at pres-
sure, which would be very useful for various
purposes at a farm steading, and specially so
for the extinguishing of fires. It is also ap-
plicable to the feeding of stationary boilers,
as it can be very closely regulated to the
supply required by the loss by evaporation,
and thus tending in a high degree to the
avoidance of one common source of explo-
sions, namely, lowness of water in the boiler
through neglect or inattention.

Our Pasture Grasses

POA NEMORALIS*—WOOD OR GROVE MEADOW GRASS (Linnæus).

SYNONYMS.—*Gramen paniculatum angustifolium alpinum*, of Scheuchzer, 1708. *Gramen sylvaticum*, Dillenius, 1719. *Gramen nemorosum*, of Vaillant, 1747.

DESCRIPTION.

ROOT perennial, fibrous, and slightly creeping; stems 15 inches to 2 feet in height, gracefully slender, erect, almost smooth, distinctly flattened, and five or six jointed. Leaves on more or less upright barren shoots, as well as on the fertile stems, the upper one of the latter longer than its sheath, and furnished at the junction with a very short obtuse ligule; all narrowish, acute pointed, flat, slightly rough on the edges, as well as on the whole inner and upper part of the outer surface, and of a thinnish, somewhat delicate texture, those next the roots withering and partly disappearing as the plants approach the period of flowering. Inflorescence in compound, elegantly bending panicles; of which the branches are rough, slender, and the lower ones are from two to four together. Spikelets acutely ovate, slightly flattened, and usually containing from three to five awnless florets or seeds. Calyx of two nearly equal acute, three-ribbed glumes, the upper half of the middle or dorsal rib being minutely toothed; florets generally very delicately webbed at the bases of the paleæ, or seed scales, the outer one of the lowest foret being five ribbed, and the lower half of the central one with the usual hairy fringe. The seed is small, oval, and flattened, with a short beak, and a small, pointed, and slightly curved awn.

branched, erect, panicles, with two or three florets in each spikelet.

NATURAL DISTRIBUTION.

Frequent, although by no means universal in woods and shaded rocky places, at all elevations in the former, and occasionally associated in the latter with varieties 3, 5, and 6, at altitudes of from 2000 to 3000 feet on the British mountains; but rarely found naturally in open pastures or dry exposed places. It is also found throughout Continental Europe, from Lapland to Spain and Italy, as well as in Northern Asia, Iceland, and North America. Dr J. D. Hooker remarks, in his "Botany of the Antarctic Voyage," that the *Poa nemoralis* of the Strait of Magalhaens and Fort Gregory is distinctly that of Ben Lawers; but it has no place in his "Handbook of the New Zealand Flora;" nor does it seem to have been discovered in any other part of the Southern hemisphere.

QUALITIES AND USES.

This species seems to have been entirely overlooked by grass cultivators till nearly the end of the first quarter of the present century when the late Mr Thomas Bishop took it into his experimental grass garden at Methven Castle in Perthshire, in consequence of having remarked the promising appearance which it presented where growing naturally on the richly wooded banks of the neighbouring Almond. He was soon able to confirm the statement made by Mr Sinclair, in his "Hortus Gramineus Woburnensis," that although never found in a natural state except in woods and shaded places, nevertheless the seeds vegetate readily when sown on



Poa nemoralis, natural size.



Reduced size, shewing habit of growth

more than Pacey's rye-grass, of which, however, 332 lb. was lost by allowing the crop to stand till the seeds ripened; whereas that of the rye-grass, at ripening, had increased by



Seeds—Magnified three diameters.

about 337 lb., consequent, no doubt, on its much more bulky and heavy crop of nutritious seeds.

VARIETIES.

The different forms of *Poa nemoralis* present considerable similarity in their general appearance, associated, however, with such important differences in their structural details, more especially in the presence or absence of the web-like floret and seed appendage, that some authors have felt themselves justified in separating several of them into distinct species. All, however, are so closely allied in habit of growth and agricultural value, that we have deemed it best to include them in the following enumeration of varieties, accompanied with the specific names that have been accorded to them, and the names of their authors:—

1. *Poa nemoralis albacaulis*, or white-stalked wood meadow grass.—This curious variety was discovered by the late Mr Archibald Gorrie, at Annat, Perthshire, about thirty years since. It was fully as vigorous in growth as the ordinary form, but its stalks, panicles, branches, and principal leaf veins, were pure white, thus differing essentially from other variegations, which are more indiscriminately diffused over the foliage.

2. *P. n. angustifolia*.—This was the variety grown in the Woburn grass garden, and formed the subject of the fore-mentioned experiments,

detailed under the heading "Qualities and Uses," and "Chemical Analysis." It has somewhat narrower leaves than the typical species before described, but is fully as strong in growth, and its foliage is a slight shade more light or grassy-green coloured.

3. *P. n. Balfouri* was named by Dr Parnell, in his "Grasses of Scotland," 1842, in compliment to Dr J. H. Balfour, then of the Glasgow University, but now Professor of Botany in that of Edinburgh. It has been found on Benvorlich and other mountains of Perthshire, as well as on the Clova Mountains in Forfarshire, growing on micaceous soil, at elevations of from 2000 to 3000 feet, and it has also been discovered on the higher mountains of Yorkshire and Northumberland. Dr Parnell describes it as having slightly-webbed florets, and being closely allied to *P. nemoralis*, but differing from it in the ligule of the upper sheath being prominent; the upper leaf scarcely so long as its sheath; all the joints situated on the lower third of the stem, and covered by the sheaths; and the stem slightly roughish, whereas in *P. nemoralis* the ligule is very short; upper leaf as long, and often longer, than its sheath; upper joint situated not below the centre of the stem, and not covered by the sheath; stem smooth. He also describes two varieties—*P. Balfouri rigida*, of short, stout growth, and having a simple panicle of few spikelets; and *P. B. extensa*, of tall and slender growth, but also with a simple panicle of few spikelets.

4. *P. n. elatior*.—A tall and strong growing variety, cultivated by some Continental seed growers, and which was first introduced to Britain from Hamburg by Messrs Lawson & Son, of Edinburgh, in 1841.

5. *P. n. montana* of Koch.—This is the *P. montana* of Parnell, *P. glauca* B. of Wahlenberg's "Flora Lapponica," *P. glauca* of "The Hortus Gramineus Woburnensis," but not of Smith's "English Flora," which is the *P. cæsia* of Koch, Parnell, and others, and the *P. glaucocæsia* of "The Hortus Gramineus Woburnensis." Its florets are not webbed, the ligules very prominent, the second sheath extends beyond the upper joint of the stem, and the whole plant is of a glaucous green colour, but less so than the *P. cæsia*. It is found on

Ben Lawers, Perthshire, at an altitude of about 3600 feet, and some other Scotch mountains, as well as on the Swiss Alps, and on other elevated ranges of the Continent. Although naturally an Alpine grass it grows and seeds freely under ordinary cultivation; and grown at Woburn on a rich sandy loam, its produce at flowering was at the rate of 8848 lb. per acre, which lost, in drying, 5308 lb., and yielded fully 345 lb. of nutritive matter. While at ripening, the weight was 10,209 lb. of grass, which lost 5615 lb. in drying, and yielded fully 438 lb. of nutritive extract, so that it stood in favourable comparison with the *P. n. angustifolia*; a result which should recommend it to those who prosecute the improvement of pasture lands at high altitudes.

6. *P. n. Parnelli*.—Named in compliment to Dr Parnell, author of "The Grasses of Britain," by Mr Babbington, in his "Manual of British Botany," wherein he, however, admits that it is too nearly allied to *P. nemoralis* to constitute a distinct species, although it differs in having webless florets, or only with occasional slight traces of a web at their base; longer, yet very short truncate ligules, and in the upper stem leaf being usually longer than its sheath. The stems are of erect growth, and five or six jointed, the upper joint being about the middle of the stem, and not covered by the sheath of the second leaf. First discovered at High Force, and other parts of Upper Teesdale, growing in sheltered and rocky situations, by Mr Babbington, about 1843, and since found in several other upland English stations. Closely allied in size and habit of growth to the ordinary form of *P. nemoralis*, to which it may also assimilate in agricultural value: although, like the last

7. *P. n. sempervirens*, or evergreen wood meadow grass.—This variety was introduced to the Glasgow Botanic Garden about 1822, under the name of *P. nervosa*, or Hudson Bay hay grass, where, during the excessive drought of 1826, it attracted the attention of the late Mr Thomas Bishop, of Methven, by the fresh growthy appearance of its foliage, when most other grasses in that then extensive collection were withered and dry. On testing it by cultivation, he found that in addition to this drought resisting property, it also possessed those of perpetual greenness, rapid reproduction at all seasons when either cut or eaten down, remarkable earliness in spring, and fully equal adaptation with the ordinary European form of the species, for growing under the shade and drip of trees, while it surpassed it in bulk of crop, more especially in that of the aftermath; and was of a more lively green colour, producing a thicker and more successive growth of flowering stems, leafy shoots, and root foliage. By 1836, Mr Bishop had introduced it pretty freely into the parks and woods about Methven Castle, and was able to dispose of its seeds to both home and continental growers; the latter of whom, in five or six years later, were re-importing its seeds through British seed merchants, and it has ever since been deservedly preferred by cultivators to any of the other varieties. The similarity of the name *P. nervosa* to *P. nervata*—that of a very different North American species—at first led to some confusion, which suggested the more characteristic name of *P. n. sempervirens*. The latter, although found by the Woburn experiments to possess valuable properties, has only been cultivated to a very limited extent in Britain, in consequence of its seeds not vegetating freely, although these are abundantly produced.

The Farm.

A "WASTE OF WATERS" TRAVELLER ON WASTE LANDS.

WE direct attention to the following paper read by Captain Maxse, at the Botley and South Hants Club. No one can read it without being interested, and without admiring the industry and the ability of the seaman who is the author. But then there is likely a probability that practical people will ask if this gallant tar can plough the land, as well as, we presume, he can plough the sea. His ideas of the distribution of population are certainly, to our notion, not quite those which would bring this or any nation prosperity. He says, what we suffer from is congestion in the towns and depletion in the provinces; and again he tells us, in a deploring style, on Mr Caird's authority, that the "population of the people of England employed in agriculture has diminished from a third to a tenth." Now, instead of regarding these facts over which Captain Maxse sheds tears, as indicative of our nation's decay, we look upon them in a light precisely opposite. To us it seems it is rather proof of England's greatness that she can cultivate more land (as all statistics prove she is now doing) than she could formerly with fewer hands. It shews that there is more science in farming than there was wont to be, that the brains of man have invented machines which do away in great part with that toilsome and brainless work which men did before. There is, laments Captain Maxse, only 347 persons to the square mile in the rural portions of England, while there is 137,000 to the square mile in London. But is this a matter for lamentation? Surely not, but rather for congratulation. Suppose for a moment there were 137,000 to the square mile in the country, what would become of them? Could they subsist, even were all the waste lands cultivated, and these are 31,500,000 acres in round numbers. Leaving out the hundred

thousands, and making the numbers only 1300, how could they live on the land uncultivated at present? The truth appears to us that the aggregation of people in towns, instead of exhibiting a falling off in agriculture, is the greatest testimony to its improvement, and to the improved mechanical appliances employed in it. And all facts prove this, that agricultural labourers are much better paid at the present day than ever they were before.

Sentimentalism is good in its way, but it is strange how sheepish it appears when set face to face with figures. Many there are who—misled by, or misunderstanding it may be, the lines quoted below from Goldsmith's "Deserted Village"—rave about "the good old times"—and incite others to the same madness:—

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates, and men decay.
Princes and lords may flourish or may fade;
A breath can make them as a breath has made;
But a bold peasantry, their country's pride,
When once destroyed, can never be supplied.
A time there was ere England's griefs began,
When every rood of ground maintained its man.
For him light Labour spreads her wholesome store,
Just gave what life required, but gave no more.
His best companions, innocence and health,
And his best riches, ignorance of wealth."

This is certainly very good poetry, but wretched political economy. Garrick said of Goldsmith that he

"Wrote like an angel, but talked like poor Poll."

But really his writing here, though beautiful in expression, is in sense little better than the great actor described his talk. Fancy, with our population now-a-days, men making out of the land only what life required and no more! Had the Malthusian doctrine been carried out, it might have done well enough, or could one get rid of surplus population as

the Chinese do, it might suffice for every man to sit under his "own fig tree;" but in present circumstances it would be awkward for the 137,000 on the square mile.

Then Captain Maxse regrets that there are 11,000,000 of inhabitants in towns in England, whereas there is only 9,000,000 in the country; while in Belgium there are 3,500,000 in the country to 1,500,000 in the towns; and France has 23,000,000 in the rural districts, to 15,000,000 in the urban. Again, we say that these facts are not to be mourned over. The decrease of labourers in agriculture, with an increase in the area of cultivation, establishes, as we have before stated, the improved character of our farming; and the more liberal wages of labourers prove, that they are better off too. Having said thus much in disproof of Captain Maxse's apparent theory that agriculture is on the decline because fewer people are engaged in it, we cordially agree with him that much land that is now lying waste might easily be made to yield food both for man and beast, in abundance enough to compensate for any outlay of capital poured into it. And we also coincide with him that the employment of money in reclaiming lands at home would be better spent than in using it to send our workers to labour on foreign lands. But we must now let Captain Maxse speak for himself:—

ON WASTE LANDS.

The total acreage of the United Kingdom amounts to 77,500,000, and of these we have, according to the Board of Trade Returns, just issued, 40,000,000 under all kinds of crops, bare fallow, and grass, and out of these 46,000,000 there are 23,000,000 acres of permanent pasture, meadow, or grass, exclusive of heath or mountain land. The balance of 23,000,000 acres is unaccounted for, and is supposed to be waste land. Taking the figures of the Board of Trade Returns, we find that the area of permanent pasture, exclusive of heath and mountain land, is 23,000,000 acres, and the area of waste land is 23,000,000 acres.

In Wales, out of an area of 4,734,486, we have—1,003,105 under all kinds of crops, bare fallow, and grass, under rotation; 1,527,534 under permanent pasture, exclusive, &c.; 2,203,847 waste, or unaccounted for.

In Scotland, out of an area of 19,639,377, we have—3,325,868 under all kinds of crops, &c.; 1,112,269 under permanent pasture; 15,201,240 (three-quarters of whole waste, or unaccounted for).

In Ireland, out of an area of 20,322,641, we have:—5,596,824 under all kinds of crops, &c.; 10,046,877 under permanent pasture; 4,678,940 waste or unaccounted for.

In the Isle of Man, out of an area of 180,000, we have:—67,677, under all kinds of crops; 16,860 under permanent pasture; 95,463 (more than half) waste, or unaccounted for.

Two questions present themselves for consideration—1. How much of this land should be in cultivation? 2. What is the cause of fertile land lying waste? There was great difficulty in answering the first question with accuracy. There was no help to be got from official returns, those of the Board of Trade being confined entirely to the produce of land in cultivation. The figures as to cultivatable land out of cultivation were generally quoted from Porter's "Progress of the Nation," Spackman's "Analysis of the Occupation of the People," and M'Culloch, and mainly founded upon a statement by Mr William Couling, a civil engineer, who travelled all over England to gather statistics for a select committee of the House of Commons in 1827, and who said that there were probably but 15,871,463 acres of the United Kingdom irreclaimable, and upon his authority we were led to conclude that there remain at the present moment no less than 15,595,968 acres of cultivatable land still lying waste. Mr Couling's figures were not unimpeachable, and as an illustration, he estimated the cultivated land of Hampshire at 900,000 acres, whereas by the Board of Trade Returns now we have but 685,540 acres cultivated, and he estimates the total amount of cultivated land in the United Kingdom, in the year of his

port, at 46,000,000, which is all that we have now after the enclosure of an additional million.

Coming next to England and Wales, where we have 11,423,742 waste acres, Captain Faxe referred to several articles written by practical men from time to time in the Royal Agricultural Society's *Journal* upon the condition of various counties. Among them there is universal concurrence of opinion as to the extraordinary waste of our land wealth. Mr Dyke Acland, whose authority will be regarded as unexceptionable, says that in Somersetshire alone "there are thousands of acres of moor and fen land capable of the highest order of arable cultivation." We have similar remarks on other counties. Mr Bailey Denton stated before the Rivers Commissioners, that whilst "only 2,000,000 acres of land in Great Britain have been drained, upwards of 20,000,000 remain undrained, and of this about 9,000,000 are clay soil." Gen. Alexander, in a lecture says—"Some few years since, when visiting Cornwall, I saw large tracts of waste land in all directions, and some of it covered with luxuriant growth of gorse and ferns. How is it, I used to ask in my ignorance, that land which can grow such magnificent weeds is not turned to better account? "Impossible," was the answer I always received; "the land is not worth cultivating; it would not pay." Of course I had to be satisfied with this answer. Only last year, on re-visiting Cornwall, I found that a large portion of the neglected land was in full cultivation, and bearing rich crops. "I see a great change," I observed to a friend. "Yes," he said in reply, "there is a great improvement; the farmers have taken in a great deal of the waste land, and some of it now forms the most productive portions of their farms." General Alexander then refers to one of the causes that had tended to produce this result—"the landlords had granted their tenants very long leases of their land at exceeding low rents."

Then we had general evidence from the Enclosure Commissioners, who have to report on the character of the waste land which is

enclosed under authority. Since 1827, about one million acres have been enclosed, and a large portion of it brought into cultivation. This is not much, seeing that population has about doubled since that date; but it proves, in spite of the disadvantage under which agriculture labours in this country, that it has paid to cultivate a large amount of waste land. I have been careful to say that only a "large portion" of this has been brought under cultivation, because I believe that some of it, notwithstanding the plea upon which it was annexed to neighbouring estates, remains untilled, owing to the neglect and indifference of landowners. It may, however, be said, that the land will not pay to cultivate, and that whatever has remained out of cultivation does so upon the sound commercial principle of its not paying. Now when we say this we must be very clear as to what we mean by "paying." If we mean that the land will not pay a high rate of interest upon a high nominal value, which is purely an artificial one, there may be truth in the assertion, as far as the owner is concerned; but he should have considered this previous to undertaking responsibility of ownership. I contend that no one is justified in wasting (to a clearly appreciable extent) the productive power of land; and it must be remembered, that although the land may not pay on the entire investment, including the purchase-money, it certainly will pay on the capital necessary to bring it into cultivation; there is, therefore, no ground for shirking the outlay—it is perfectly clear that the land pays no one while lying waste. Far more strongly does this argument tell in regard to common land that has been taken from the community, and allotted to proprietors with the express object of bringing it into cultivation for the general good. I cannot wish for a better illustration of the unjustifiable waste of good land, or of the contrast between the interest of large and small landowners in the cultivation of soil, than is afforded by a common in my neighbourhood, called Titchfield Common. I shall content myself with a bare narrative of the facts of the case. This common

are over-populated. What we suffer from is, the congestion in the towns and depletion in the provinces. The method in which population is reckoned conveys a very fallacious idea. For instance, it is said that England and Wales have 347 persons to the square mile, but in some districts we have not more than one person to the square mile, and in the east end of London we have 130,000 persons to the square mile. The really important point in regard to population is its distribution. While we have 11,000,000 in the towns, there are but 9,000,000 in the country; whilst Belgium with a poor soil is better off, although she has 430 persons to the square mile, for out of her population of 5,000,000, 1,500,000 live in towns, and 3,500,000 in rural parishes. In France, of the population of 38,000,000, 23,000,000 are rural, and 15,000,000 non-rural. The most extraordinary and instructive statistics come, however, from the Channel Islands, which exist under a totally different land system to our own, and under which we find 1200 persons existing happily, and in perfect comfort, to the mile, and land let (when let) at £5 to £6 per acre. Even the little island of Sark, with an area of only $2\frac{1}{2}$ square miles, and no harbour, maintains 232 persons to the square mile, enjoying positive independence and happiness, and exporting more articles of consumption than they import. I take this information from a valuable pamphlet upon "The Land Question of the United Kingdom," by Mr Tupper, of Guernsey, and I cannot resist calling your attention to the very instructive comparison he draws between the statistical position of the two classes of dependencies of England which are subject to different land systems. The first place he looks at is the Isle of Wight, which, "with 86,801 acres of land has a population of 55,362, and scarcely any shipping or commerce." On the other hand, Jersey, with "under 28,000 acres, has a population of 55,613, and 55,000 tons of local shipping, carrying on trade and commerce with the whole world."

After further extracts the lecturer continued. Yet, it may be urged, the wealth of the country is enormous. So it is in one

sense. So far as the measure of money goes we—that is, some of us—are immensely rich. In the space of fourteen years our aggregate exports and imports have increased from £268,210,145 to £523,100,229. These big figures produce a very imposing effect—also it is to be feared, a rather soporific one. People listen to them, say, "All right," and go fast asleep over evils which in the mean time ripen, and ultimately re-appear intensified. Notwithstanding the apparent wealth suggested by these figures, there would appear to be paralysis at the very source of the nation's life. While there is superfluous capital, there is some cause that prevents capital turning itself upon English land and employing English labour. We want to grow more food. In order to do this, three ingredients are necessary, capital, labour, and soil. We have them all in superabundance. But the capital flies abroad, the labour goes to the workhouse and the gaol, and the soil lies waste, or at best grows Japanese pheasants for some idle gentleman to shoot at—who may be has so many other places to idle at, that he can only afford one week to idle at the place where the Japanese pheasants have to be shot. Look at the amount of food we import from other countries. I believe myself we are too dependent upon other countries for food. Free trade is right, but home waste is wrong. Ever granting that we can obtain corn cheaper from other countries than we can grow it ourselves, it is quite certain that we already grow some at home, and if we can, we should grow more. But putting entirely on one side our importation of wheat, there yet remains an expenditure of £42,000,000 in foreign agricultural produce and stock. Since 1854, our importations of food have almost doubled. Captain Maxse here enumerated the various items of food imported. Now, how much of this food might we not grow at home? Look at the price of meat, a commodity which it is costly to import; compare the present price with its past. In the sixteenth century, beef and pork were sold at a halfpenny a pound and veal at three farthings; in the eighteenth century, it rose to 3d. a pound; and now in the nineteenth century it has risen to a pro

hibitory price as far as the poor are concerned.

Again, what a volume of comment is afforded in that single item about eggs—£1,000,000 for foreign eggs! Our dairy produce, not less than our meat growth, is—it must be confessed—miserably deficient. The reason of this is that dairy produce is the result of small farms, and these we have very nearly abolished in England. There is another point worth considering. Look at the cost of our pauperism and crime. We spend some £18,000,000 in the relief of distress and the repression of crime. Some people will say, "Oh, you must always have pauperism and crime." To this I enter my most vehement protest. Misery is not God-ordained (how ever convenient it may be to declare it is), but man-ordained. Nature supplies everything in abundance. We cannot, in the midst of our human hive, overflowing with energy and activity, seal up with impunity the primeval source of all human industry and wealth. If we do, the energy and activity display themselves in very unpleasant forms. Paupers and rogues are manufactured as much as any other article. I think we should do well to remember the terrible disadvantage that poor people labour under, born into a country where—being themselves destitute and without prospect—to use the words of Tennyson's "Northern Farmer"—

"Proputty, proputty's ivry thing 'ere, an', Sammy,
I'm blest

If it isn't the saame oop yonder, fur them as 'as it',
the best.

'Tis'n them as 'as munny, as breäks into 'ouses an'
steals,

Them as 'as coäts to their backs an' taäkes their
regular meals

Noä, but it's them as never knows when
to be 'ac

Taäke my word, Sammy, the
s'ber

The question of the value of land is a very old one, and has been discussed by philosophers and statesmen from the earliest times.

The property of land is a subject which has been discussed by philosophers and statesmen from the earliest times.

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The cause is to be attributed to our land system, because it promotes the accumulation of land into few hands, artificially restricts its circulation in the market, and encourages an artificial value being placed upon land which is detrimental to its true agricultural value. The first proposition that the land system promotes the accumulation of land in few hands, is proved by the fact that whereas in 1770 there were 250,000 rural landowners in England, we find ourselves at the last census (1861) with but 30,766, and is illustrated by the following passage from a very valuable work that has recently been published, entitled "Systems of Land Tenures in Various Countries." The article I quote from is by Mr Cliffe Leslie, upon the land system in France. He says:—"The contrast between the land systems of France and England, two neighbouring countries at the head of civilization, may, without exaggeration, be called the most extraordinary spectacle which European society offers for study to political and social philosophy. The English census of 1861 returned 30,766 landowners, and 249,461 farmers," and he goes on to tell us that, by the latest official statistics in France there are 5,000,000 rural proprietors, of whom nearly 4,000,000 are actually cultivators of the soil (the area of France being but one-third larger than Great Britain). He begged they would not think he advocated the French law of compulsory sub-division, which he proceeded to explain (although we may be quite sure that the effect of resisting moderate proposals will be that it will be ultimately demanded, and possibly conceded in a panic). The evil effect of our land system is, that cultivation is not the primary object of ownership of land, and therefore that agricultural produce is not a measure of its value. There are two values attached to land—the one which may be called the residential value, and the other the agricultural value; and in this country the residential value (which of course is a legitimate one within reasonable limits) supersedes the agricultural value. The attention of the community has never been aroused to the importance of the sub-

it is to be feared never will be, until the land system makes itself known in a disastrous manner. Crowds from all will flock to hear the disgusting revelation of a high-life divorce scandal, and the papers that report it fully treble their subjects of the deepest social and importance, problems that depend for their solution upon the amount of money they are able to attract, questions closely connected with the lives and happiness of our fellow-creatures, and, possibly, the fate of a nation, are too often tossed with indifference aside.

An interesting discussion followed, in which Mr Blundell, Mr J. Withers, Mr Spooner, and other gentlemen, took part. Having briefly replied, Captain Maxse, in deference to the wishes of the Club, proposed a resolution to the effect that, whilst there are so many millions of acres lying waste, it was of opinion that attention should be directed to its cultivation as a means of employing our surplus population rather than to the question of emigration. This was seconded by Mr Blundell and carried; and votes of thanks to Captain Maxse for his paper, and the chairman for presiding, terminated the meeting.

EXHAUSTION OF THE SOIL.

For many years the heading of this article has formed a fertile subject of discussion. There is more involved in it than mere words express. It is not alone exhaustion of the soil, but that in relation to the contracts between landlords and tenants, and the difficulty connected with arbitration in the case of a difference between contracting parties. A paper on this subject was recently read by Mr J. B. Lawes, of the Farmers' Club, from which we have the following extracts:—

MR LAWES' PROPOSITIONS.

Whether, in order to preserve the soil from exhaustion, it is necessary to enforce a rotation of crops. 2. What are the most generally applicable means at our disposal, for the estimation of the value of exhausted manures? In considering the characters of soil with the view of arriving at an answer to these questions, it will be to confine attention mainly to the description and illustration of those qualities which are commonly known under the term "condition," and to pointing out the distinction between these and those which are due

to what may be called the normal or natural fertility of the soil.

"CONDITION" OF LAND—WHAT MEANS IT?

The word "condition" is in very common use amongst agriculturists. It is said that a farm is "in condition," or "out of condition," or in "high condition," or in "low condition." These terms are well understood to imply certain states of fertility which it is not easy to define more accurately in a few words. By way of special illustration of such "condition" I will direct attention to some results selected from among those of the numerous field experiments made on my farm at Rothamsted. I will first call attention generally to the fact that, throughout the long periods over which these various experiments have extended, condition has been equally kept up, whether farm-yard dung or certain chemical mixtures were employed. In the wheat experiment; the average of twenty-six successive crops, grown by farm-yard dung, was $33\frac{3}{4}$ bushels; the average on plot 16 of twenty-one crops grown by artificial manure was $36\frac{1}{8}$ bushels, and the average on the same plot over thirteen years, when the artificial manures were

During the twentieth century, the chemical industry has been able to produce a wide range of synthetic materials, many of which have replaced natural materials. The most common synthetic materials are plastics, which are made from petroleum products. Plastics are used in a wide range of applications, from packaging to construction. Other synthetic materials include synthetic fibers, which are used in clothing and textiles, and synthetic rubbers, which are used in tires and other automotive parts. The chemical industry has also been responsible for the development of many new drugs and medical treatments, which have greatly improved the quality of life for many people. However, the chemical industry has also been responsible for the production of many pollutants, which have caused environmental problems. Therefore, it is important to ensure that the chemical industry is regulated properly to protect the environment and public health.

MINERAL MANURE AND AMMONIA-SALTS.

During the first eight years of the twenty-six, that is, from 1844 to 1851 inclusive, three plots were manured with various, but, upon the whole, somewhat similar mixtures of mineral manure, ammonia-salts, and some bone-cake, and gave nearly equal average yields to produce over the eight years, 30½, 30¼, and 28¾ bushels respectively. From that date, 1852, to the present time, a period of eighteen years, one plot has been manured with a mixed mineral manure containing salts of potass, soda, magnesia, and superphosphate of lime; and every year during the same period two plots have been

1 with the same mineral manure or ammonia-salts alternately. For example, in one plot we shall call 17, received ammonia-salts, and plot 18 the mineral manure. In plot 17 received the mineral manure, and plot 18 the ammonia-salts, and so on, alternately for the eighteen years; thus, plots 17 and 18 have each been manured nine times with ammonia-salts and nine times with the mineral manure during the eighteen years, the difference being, that when one received ammonia-salts the other received mineral manure, *vice versa*; and, accordingly, we have each year one plot manured with mineral manure, and the other following a residue of ammonia-salts, and the other plot manured with ammonia-salts following a residue of mineral manure. Over the eighteen years, the average produce of plots 17 and 18 was exactly the same, 24½ bushels in each case; but if we take the average of the eighteen crops manured by mineral manure alone, whether plot 17 or 18, we find it to be only 14 bushels, whilst the average of the eighteen crops grown on either plot by ammonia-salts was 24½ bushels, or nearly 14 bushels per annum more. The results of experiment on the growth of barley for eighteen years in succession on the same land, were very similar to the average produce of our consecutive four-course rotations, in the turnips were liberally manured with mineral manure, ammonia-salts, and rape-cake, and the whole crop (roots and tops) removed from the land was about 13¼ tons of dry matter; yet the unexhausted residue from the manure applied for the turnip crop was such, that the average produce over the four courses was 21½ bushels of barley, 21½ bushels of clover, and 36¾ bushels of wheat, was obtained. In the experiments on permanent pasture land, plot 2 was manured with 14 tons of farmyard dung pre-maculated for the first eight years, and has since, that is, for the last eight years, been left entirely unmanured. During the eight years of the application of the average annual produce of hay was 43 cwt. under 43 cwt., and that during the six following years it amounted, without any application of manure, to a little over

43 cwt. of hay, thus shewing a very marked effect from the unexhausted residue of the previous heavy dressings of farm-yard dung.

HOW THE CONDITION OF LAND MAY BE MAINTAINED.

From the above results relating to wheat, barley, rotation, and permanent meadow, the following conclusions may be drawn:—

1. That condition of land may be maintained, either by farm-yard manure or by artificial manures.

2. That when active nitrogenous manures, such as Peruvian guano, ammonia-salts, or nitrate of soda, are applied in only the moderate quantities usually employed in practical agriculture, the unexhausted residue left in the soil after the removal of a corn crop has but little effect on succeeding crops.

3. That when rape-cake and other purchased organic manures, which yield up their fertilizing elements comparatively slowly, are employed, the unexhausted residue left after the removal of the first crop may yield an appreciable amount of increase throughout a rotation.

4. That when farm-yard dung is employed, the effects may be apparent for a still longer period.

5. That when mineral manures, such as phosphates, salts of potash, &c., are used, the effects of any unexhausted residue are too slow and gradual to admit of any determination of their value. Admitting that the recognized rotation of any district may be, upon the whole, the most suitable to follow in it, it nevertheless will not be denied that the farmer of intelligence and capital would, if he were permitted to do so, occasionally deviate from it, with profit to himself at any rate. It will be well, therefore, to direct attention to some results illustrative of the extent and limit of the productive capability of a soil of a certain class or character, with a view of forming some judgment of the probability of injury to the land by a deviation from the ordinary course of cropping.

CROPS WITHOUT MANURE.

I have sought to gauge the capability of my soil to yield crops for many years in suc-

cession without manure, and even under more exhausting conditions still. It should be stated, however, that in no case has any attempt been made to increase the productiveness by either subsoiling or deeper ploughing than usual, though great care has been taken to keep the land as free from weeds as possible, without injury to the crop by treading. The produce of wheat obtained for twenty-six years in succession, from 1844 to 1869 inclusive, on a portion of the experimental wheat field, which has received no manure whatever since 1839; per acre per annum, over the 26 acres, has been rather over $15\frac{1}{2}$ bushels of dressed corn, about 14 cwt. of straw, and $22\frac{3}{4}$ cwt. of total produce (corn and straw together). The average over the second half of the period is $1\frac{1}{4}$ bushel of corn, and $2\frac{3}{4}$ cwt. of straw—less than over the first half; shewing, perhaps, a slight, but at any rate no very marked, tendency to decline in annual yield. I hold in my hand a specimen of this unmanured produce grown in 1868, the twenty-fifth crop of wheat in succession, and the twenty-ninth crop since the application of any manure to the land. Here also is a section of the soil, taken to the depth of 27 inches; and, so far as can be judged from appearance, certainly no one of experience in such matters would take it to be naturally more fertile than the majority of moderately heavy soils in this country. Nor does the rent of similar land in the neighbourhood (25s. to 30s. per acre tithe-free), or the condition of the farmers of the district as to wealth, indicate any great fertility of the soil. The average of the 2d, 3d, 4th, and 5th courses of five consecutive entirely unmanured four-course rotations; of the four crops of Swedes, roots and tops, was $18\frac{3}{4}$ cwt.; of the four crops of barley, $40\frac{1}{2}$ bushels; of the four crops of beans, $12\frac{5}{8}$ bushels; and of the four crops of wheat, $34\frac{1}{8}$ bushels. To sum up the chief points of these illustrations of the limit or limit of the fertility of a somewhat heavy loam, of by no means extraordinary quality, it has yielded an average annual produce, without any manure at all, of $15\frac{5}{8}$ bushels of wheat for twenty-six years, of $20\frac{1}{8}$ bushels of barley for eighteen years, of $23\frac{3}{8}$

cwt. of hay for fourteen years, and, under rotation for twenty years, an average over the last four courses, or sixteen years, of $40\frac{1}{2}$ bushels of barley, $12\frac{5}{8}$ bushels of beans, and $34\frac{1}{8}$ bushels of wheat. I confess that my view of the productive capability of heavy, or even moderately heavy soils, has undergone considerable change since I commenced the various experiments to which I have referred. Formerly, I supposed that a very few years of consecutive corn-growing would suffice to reduce the corn-growing capabilities of any ordinary soil to practically nothing. Such, however, is not the case; and a very little reflection will shew how essential it is for the well-being, if not, indeed, for the existence of man, that the elements of fertility should be so locked up and distributed throughout the soil as to be capable of being taken up by crops extremely gradually, and so to last for an immense period of time.

LOCKED-UP MANURE.

If needy landlords or indigent tenants could have drawn upon the locked-up elements upon which the maintenance of the natural or standard fertility of the soil depends, how little fertile soil would still remain in England? A soil which would yield only 5 bushels of wheat would probably bear no rent at all, the whole value of the produce being required to meet the cost of cultivation. The soil yielding 15 bushels would doubtless pay a rent, and the one yielding 25 bushels a considerably higher rent. But now let us assume that all three cultivators were able to go into the market and purchase cattle-food and manure; the three soils would be very differently affected by this importation of elements of fertility from without. An amount of money expended in food and manure that would raise the produce on the poorest soil from 5 to 25 bushels would not raise that on the medium soil from 15 to 35 bushels, and still less would it increase the yield on the best soil from 25 to 45 bushels of wheat. It is obvious, therefore, that the surplus available for rent, dependent on such a use of elements of fertility from without, would be proportionally the greatest on the

poorest soil, and the least upon the naturally most productive soil. It is chiefly in the fact here illustrated that is to be found an explanation of the rapid rise in the rent of light soils of late years; compared with heavy land, they are cultivated at a less cost, they are much better adapted to carry stock, and, with the aid of purchased food and manures, they can now rival in productiveness the natural fertility of clays and loams. Thus, the productiveness of light soils is in a greater degree dependent on the amount of capital expended on food and manure than in the case of the heavier soils. Moreover, the increased fertility, and the increased rent of the lighter soils of late years, are partly due to the accumulations from the past expenditure of the tenant. This increased productiveness is, however, of the character of improved "condition;" and hence it is that the productiveness of such soils may be comparatively easily and rapidly reduced. That, excepting in the case of light soils under the conditions above referred to, the amount of rent paid is, in practice, chiefly dependent on the natural fertility of the soil, and not on the amount of capital employed by the tenant, is evident from the fact that there are, on many estates, highly cultivated farms with abundance of capital invested, adjoining others in a very opposite condition; the poor farmer being able to set apart from the produce of the land as large a surplus in the form of rent as his higher farming neighbour; whilst any demand for an increase of rent, on account of increased capital employed, would be met with the remonstrance that the benefits arising from the increased expenditure of capital by the tenant should justly accrue to himself. From the facts and arguments which have been adduced in regard to the natural fertility of the heavier soils, and to the essential conditions of productiveness of the lighter soils, the question naturally suggests itself—whether, or under what circumstances, the more frequent growth of corn than accords with the recognized rotation of a district might be permitted without risk of deteriorating the property of the landlord? The

same result, namely, the export from the farm of larger crops within a limited period of time, follows in like manner from the use of the subsoil plough, the steam-smasher, and a great variety of implements of modern application. In fact, all these processes, which are regarded with favour rather than otherwise, have the one object and result of causing the soil to yield up its elements of fertility more rapidly.

I believe that whilst a greater freedom from the adoption of a fixed rotation would often be beneficial to the tenant, it would not, if accompanied with proper conditions, result in any injury to the landlord. In saying this, I trust it will not for a moment be supposed that I would recommend the abandonment of a rotation of crops, and the continuous growth of corn. To be more specific, what I do think is, that where fallow, or liming, or subsoiling, or steam-smashing, and allied processes, are admissible and advantageous, or where root crops cannot be consumed on the land during wet weather without injury to the succeeding crops—that is to say, on the heavier and deeper soils—barley may often be grown both in larger quantity and better in quality after wheat than after a root crop. Again, where mangolds are manured, as they often are, with 20 or even 30 tons of dung per acre, I see no objection, either from a scientific or practical point of view, in taking out of the land the large quantity of mineral constituents still remaining available after the removal of the mangolds, by growing two or even three corn crops in succession, with the application of artificial manure for each extra crop. Very generally, indeed, two corn crops might be taken in succession from medium and heavy land, provided it be kept free from weeds, and artificial manures be applied for the second crop. Nor do I think that real injury would be done by the occasional growth of peas, or even an extra corn crop, on light soils, when the seeds have failed, as occurred after the dry summer of 1868; indeed, as much of some fertilizing matters might be washed out of the soil by drainage as would be exported from the land in the extra crop. It will be admitted on all h

that if the tenant were unconditionally free as to his course of cropping, and he were to leave his farm wholly under corn, the landlord would not so readily obtain a tenant for the farm. I would propose, therefore:—

1. That all land should be given up with a fixed proportion under fallow, root crops, seeds, and corn crops; the proportions to be settled according to the custom of the locality and that the out-going tenant should pay a compensation to be assessed by competent valuers, for any excess of land under corn over the so fixed amount. 2. That, excepting under special arrangement, and with the purchase of stable dung, no straw or root crops shall be sold off the farm. 3. That the tenant should be required to keep the land free from weeds, and, in default, to pay compensation to the landlord or in-coming tenant for the cost of cleaning, such cost to be assessed by competent persons. The cost of cleaning foul land which is in high condition is much greater than that of putting land which is poor in condition, but free from weeds, into good condition. Moreover, the state of the land as to weeds should be one important element in deciding whether an extra corn crop should or should not be taken. It has been shewn by reference to direct results, that some important constituents of manure either leave little or no unexhausted residue in the land, or leave it so combined within the soil, or so distributed throughout it, that it produces little or no appreciable effect on succeeding crops. Some manures, on the other hand, have been shewn to produce marked effects for several years after their application. It is obvious, therefore, that it would require a very complicated sliding scale to enable us to estimate the value of unexhausted manures under the many varying conditions as to the description of the manure employed, the soil, the season, and the crop grown, were it attempted to take into consideration the valuation of constituents already in the ground. In Lincolnshire and adjoining counties, half-inch bones are valued to the in-coming tenant the second year after application, and in some instances guano is

valued after it has grown a crop. It would, I think, be much more satisfactory that all valuations should, if possible, relate only to what is above ground. Nor do I see any difficulty in doing full justice to the out-going tenant without taking into account the value of the unexhausted residue of manures which have already yielded a crop. The three items upon which I would rely as the basis of a valuation in favour of the out-going tenant are—the farm-yard manure made during the last year of the occupancy; the manure from purchased food which has not grown a crop; and the straw of the corn crops of the last harvest. The quantity of straw grown is a pretty sure indication of the condition of the land in regard to recent manuring. To take an extreme case by way of illustration; the continuously unmanured wheat plot which has been already referred to gave an average of only about 14 cwt. of straw per acre, whilst plot 16 gave, over the thirteen years of heavy manuring, 46½ cwt. or 3⅓ times as much. Now, if I had entered upon a farm with the straw of the corn crops given over to me not exceeding 14 cwt. per acre, and left it with straw averaging 3⅓ times as much, I might surely in justice claim of the landlord, or my successor, compensation for such an increase in the quantity of straw; indicating as it would the increased condition of the land. In reference to this point, it may further be remarked, in passing, that not more than about 5 per cent. of the weight of the straw is derived from the constituents of the soil itself; by far the greater part being derived from the atmosphere, through the agency of the manures applied, and directly due therefore to the expenditure of the tenant's capital. I propose then, as a part of the compensation to the improving out-going tenant, that he shall be paid the consuming value of the straw which he leaves in excess of that which he entered upon. The next point to consider is, the valuation of the manure which has been obtained by the consumption of purchased cattle-food within twelve months from the termination of the occupation, and which has not yet yielded a crop. Some years ago I published a table shewing the cal-

ulated value of the manure resulting from the consumption of one ton of each of the chief standard articles of cattle-food. Those estimates were, at the time, considered by some to be somewhat too high. They have lately been carefully reconsidered; and, taking into account the higher money value of some of the chief constituents at the present time, it has been decided to make but little further alteration than to add a few articles to the list that were not previously included in it. The results are given in the following table:—

Estimated Value of the Manure obtained by the Consumption of different Articles of Food, each supposed to be of good quality of its kind.

Description of Food.	Money value of the Manure from 1 ton of each Food.		
	£	s.	d.
1. Decorticated cotton seed cake.....	6	10	0
2. Rape cake	4	18	6
3. Linseed cake	4	12	6
4. Common cotton seed cake	3	18	6
5. Lentils	3	17	0
6. Beans	3	14	0
7. Tares.....	3	13	6
8. Linseed	3	13	0
9. Peas	3	2	6
10. Indian meal	1	11	0
11. Locust beans	1	2	6
12. Malt-dust	4	5	6
13. Bran	2	18	0
14. Coarse pollard	2	18	0
15. Fine pollard.....	2	17	0
16. Oats.....	1	15	0
17. Wheat.....	1	13	0
£ s. d.			
18. Malt.....	1	11	6
19. Barley.....	1	10	0
20. Clover hay	2	5	6
21. Meadow hay	1	10	6
22. Bean straw.....	1	0	6
23. Pea straw	8	18	9
24. Oat straw	8	13	6
25. Wheat straw	0	12	6
26. Barley straw	0	10	9
27. Potatoes	0	7	0
28. Parsnips	0	5	9
29. Mangold wurtzel.....	0	5	3
30. Swedish turnips.....	0	4	3
31. Common turnips	0	4	0
32. Carrots.....	0	4	0

It will be observed how very widely different is the estimated money value of the manure obtained by the consumption of one ton of

different articles of cattle food in common use. It is obvious, therefore, that in settling the amount of compensation to be paid to the out-going tenant for the value of the manure produced by the consumption of purchased food, it would not suffice to take a fixed proportion of the purchased food bill, but the value of the manure constituents of the particular description of food actually employed must be estimated. It would no more be fair to make the valuation irrespectively of the value of the constituents obtained from the different descriptions of food, than it would be to charge the same price for the inferior descriptions of guano as for the best Peruvian. As the value of the constituents obtained as manure from one ton of the various foods has been estimated at their market price, if sold in a concentrated, dry, and easily-portable state, some reduction from the amounts given in the table should be made in the valuation supposed, on account of the risk of loss by decomposition and drainage, and for the extra cost of carriage and application to the field, all of which will be greater in the case of the cattle manure than in that of the dry purchased manure. For these reasons, I would propose that one-third or one-fourth less than the amounts shewn in the table should be allowed for all purchased cattle food used within twelve months of the termination of the occupation, provided the manure obtained from it has not yet grown a crop. It is, I believe, the custom in Norfolk, and in some other counties, for the tenant going out at Michaelmas to apply the dung made during the previous winter to the root crop, the incoming tenant taking the crop at a valuation. The objections to this plan are, that the root crop is a very uncertain one, and may, in a bad season, be very much less than the amount of manure should produce; and that if the out-going tenant has fed his stock upon purchased food, the value of the manure cannot be recovered in the root crop alone, even if the season be favourable. For example, in one of the courses of experimental rotation to which I have referred, after a liberal manuring of rape cake, salts of am-

monia, and mineral manure, less than $4\frac{1}{2}$ tons of roots were removed; and the result was, that the succeeding crops amounted, without any further manure, to $60\frac{1}{2}$ bushels of barley, $43\frac{1}{2}$ bushels of beans, and 46 bushels of wheat. It is obvious that, under the system referred to, these heavy crops of barley, beans, and wheat, would become the property of the in-coming tenant, whilst he would only have to pay, for the manure which had largely contributed to produce them, the small value of $4\frac{1}{2}$ tons of roots. I would submit that it would be a much fairer arrangement to value the manure made during the winter by the load or ton, and that the incoming tenant should also pay two-thirds or three-fourths, the estimated money value of the manure from the purchased food consumed in its production. If, in addition to this, the out-going tenant were paid the consuming value of the straw of the corn crops of the last harvest, he would receive fair compensation for the capital which he had invested in "condition," whilst the in-coming tenant would only have to pay for that which possessed an actual money value. The conclusions arrived at in the course of the foregoing discussion may be briefly summarized as follows:—

1. "Condition" is a quality quite distinct from natural fertility of soil. It is mainly dependent on the amount of capital expended by the tenant in the purchase of cattle food or manures, and is therefore his property; it may be easily and rapidly reduced.

2. The natural fertility of a soil, whether high or low in degree, is, comparatively speaking, a permanent quality; it can only be injuriously affected by the continuance of an exhaustive system of cropping for a long period

of time; it is the property of the landlord; and, excepting in the case of very light soils, it is the chief element in determining the rent-value of the land.

3. In the case of any rate of the heavier soils, it would generally be beneficial to the tenant of capital and intelligence, if he were allowed much more freedom as to cropping than present customs permit.

4. No injury is likely to result to the landlord from granting the tenant permission to crop as he pleases, provided he be bound to keep the land free from weeds, and to leave a fixed proportion under fallow and green crops at the termination of his occupation.

5. No simple rules, applicable to various descriptions of soil, crop, and manure, can be laid down for the valuation of the unexhausted residue of previously applied manures which have already yielded a crop.

6. By the valuation of so much of the farm-yard manure, and of so much of the manure constituents derived from purchased cattle food, as have not yielded a crop, and also of the straw of the last harvest, fair compensation may be made to the out-going tenant, whilst the in-coming tenant will only be required to pay for that which has a fixed and easily-ascertainable money value.

If abundant capital is to be attracted to the soil, it is essential that liberal covenants in regard to cropping should be adopted, and fair compensation for unexhausted improvements made. If I have this evening in any degree contributed to the advancement of knowledge which is necessary before we can hope to attain marked improvement in these respects, I shall feel that I have not occupied my time in vain.

THE EDUCATION OF FARM LABOURERS' CHILDREN.*

By the Rev. D. OWEN.

MY first remark is, that I do not agree with the position which appears to be advanced by some, "Ignorance of necessity is vice, and knowledge virtue;" at the same time I urge, give to all the best education you can. The question is not "whether the industrial classes shall or shall not be educated," but "how best is the work to be effected?" Time has been when the agriculturist was charged with being opposed to the extension of education, and some of us have doubtless heard such an argument advanced by the yeomen of old. But in the present day such argument is not advanced. Either conviction has silenced the objection to education, or it is silenced by present England's almost universal voice. Speaking to you, I feel I may claim assent to the position—educate to the utmost possible, adapting such education as best you can to the station of life in which each child is placed. But here, possibly, all unanimity of judgment may cease.

When I speak of the education of the industrial classes, I mean that instruction which has combined with it the formation of the religious and moral habits and principles of man. The question then comes—How is this education to be given? The question is no new one, but it is one which circumstances have at the present time forced on the minds of all; and the answer to it lies with our nation, as the arbitrator between two strongly contending schools—the Union and the League. The Union says, "Invigorate, supplement, more aid the present denominational system, value and use all the voluntary aid and zeal you can elicit, but banish not religion from your schools." The League says, "Perish the present system, it has altogether failed, and in its place, by direct com-

pulsion, force all children to attend the school over whose portal is inscribed 'God is not named nor thought of here.'" Against such a revolutionary and destructive godless system my own principle most strongly wars, and I further strongly make assertion that the present system has not failed. It has done more than much; and, considering the hindrances it has had to labour under, it has comparatively been a great success. That it has not covered the whole of our land with schools, and embraced within its roll of scholars a much larger proportion of our children, is owing to these facts—Firstly, financially it has been starved by the State; secondly, its workers have been disheartened by the continually recurring alterations of its rules by my Lords in Council, *i.e.*, by the absence of security and the presence of unrest; and, thirdly, by my Lords withholding the grant from results, unless the results were produced after a certain prescribed method. That it has not altogether failed, these figures, as given by Lord Robert Montagu, late Vice-President of the Committee of Council on Education, may testify. There were, in 1860, 9000 schools, 1,101,545 scholars; in 1868, 15,572 schools or departments, and 3,091,531 scholars; and of aided and inspected schools there is an annual increase of 981; of scholars, 136,536. And, compared with that of other nations, what is our own educational return?

In France, the return of scholars is 1 in 9 of population; Holland, 1 in 8; England, 1 in 7; Prussia, 1 in 6¼. But of this return, it should be mentioned that in Prussia the school age is reckoned from 5 to 15 years; in England, from 3 to 12. On the other hand, I gather that many of the schools in Prussia are opened for six months only in the year; and the much-bepraised America is far behind us in the regularity of children at school, and behind us, too, in the number

* Paper read at Boroughbridge Agricultural Society.

rect ; and to this subject I must confine only further remarks I now dare inflict on you. . . . Is such compulsion needed ? I think it is.

The hindrances to education which I have mentioned as arising from the ignorance, or thy, or caprice of parents, from the claims of labour, and from the poverty which makes hungry grasp at the wages which the child earn, are too strong, and too divided in interest, and too manifold to be slightly overcome. The farmer cannot do without the child's labour ; oftentimes the parent cannot do without the child's wage. Between the two the child may be sacrificed, so far as education is concerned. Can there not be a system whereby the interest of child, parent, and farmer may be alike preserved ? For this, this plan is proffered : extend to agricultural labour the regulations of the Factory Act, the child half the day at labour, and the other half of the day at school, a penalty, by falling on the employer and the parent for every infringement of the provisions of the Act. This plan would appear to be a happy one if the agriculturists were not dependent on the seasons, and if the child's labour were only required on land immediately contiguous to his home and school-house door. But the half-day school and half-day work is an impossibility. To meet the difficulty, it is urged to alternate day-work and alternate day-school ; but to this the farmer objects, because his work cannot be carried on (especially at certain periods of the year) on this alternate system. The schoolmaster objects because of slow progress which alternate school-day makes. The same objections from both sides against the plan, three days at work and three at school. Mr Paget's plan the twofold band might answer if (1) there were children enough for the supply in every parish ; and if (2) the farmer grumbled not at the trouble and inconvenience cast upon himself. But this "fortnightly" plan of one band at school on Monday, Wednesday, and Friday, in one week, and on Tuesday and Thursday in the next—*i.e.*, on the days when the other band is at farm work, and *vice versa*—requires, as its conditions, that which, I think,

this country generally cannot supply. There remains what most commends itself to my present judgment—and what I will call the "plan of the seasons," or the "half-yearly system"—the winter for school, the summer for work ; or, without any prescription of the months for either, I would require that the child shall be at school for at least ninety or a hundred days in each year. This plan is not, I know, free from difficulties, but it appears to me more free than any other to which my attention has been drawn. Herefordshire, with its, so to speak, seven harvests, is not a good county for the working of this plan, and Lincolnshire the same ; but, as a rule, I think the "half-year system" might be made to work. By fine upon the employer, or the parent, or on both, I would enforce a half-year Act—in other words, during one-half of the year I would give to the child the valuable lesson of learning how to work, to the farmer compliance with his claim for labour, to the parent the benefit of the wages which his child could earn, and during the other half of the year I would give to the child the benefit of sound teaching in an efficient school.

But at what age shall we allow the child to work at all ? From the reports of the "commission on the employment of children, young persons, and women in agriculture," I gather this as the expression of a very general consent, that while fair employment in the fields is not injurious at all to the child's health or growth, rather that thereby he is in frame and muscle invigorated and developed, yet that no child should be allowed to work till he is ten years of age, and that none under fourteen should be a plough or carter boy. Indeed, I believe that by our present law (3 Geo. IV., cap 126, s. 131) no boy under thirteen may drive a cart upon a turnpike road. Thus, the suggestion I would offer is the "half-year system," with the just-named limits as to age, *i.e.*, no work at all allowed till the child is ten ; after that age half-work only with half-school till the child is fourteen or fifteen years old, unless, ere he attains the latter age, he has, from Her Majesty's Inspector of Schools, a certificate that he has satisfactorily passed his examination in the sixth standard of

and "washy" character, but perfectly adapted for cow food. These meadows, however, be named as a good example of an agricultural remedy for the nuisance caused by town sewage; for it is poured over such an enormous quantity that the soil is given a fair play given to it as a cleanser, and it therefore leaves the grass land still fresh and not offensive. Even here, however, we have a remarkable illustration of the purifying effect of soil and plant. Thus, on 16th March 1869, when the early crop of grass was cut, and the meadow land was in full growth, three samples of the sewage were taken. These shewed that more than four-fourths of the whole filth soluble and suspended was taken out of the water of the Foul Burn by one hour and a-half of irrigation. In the first case, and nearly two-thirds of the filth in 20 tons of sewage was taken out. In the latter case, by irrigation over about one-third part of an acre of the light sandy soil of the Lochend Farm.

Edinburgh experience, however, is not one of agricultural profit from the use of sewage, but of that perfect abatement of the nuisance, which, in the interest of the public, we desire to see. This arises from the enormous quantity of the sewer water and the small area of land on which it is used. Lochend and Craigentenny on the north-west of Edinburgh, about 230 acres receive the whole drainage of 80,000 people, at the rate of 350 people per acre. At Leith, on the south side of the city, 16 acres receive the drainage of a comparatively small number. At Dalry, on the west, 60 acres or about 100 receive a very large quantity of sewage, which they are unable perfectly to dispose of; and there are one or two plots of land treated on the road to Leith. Here, however, altogether are only 400 acres, and the population whose drainage they must largely exceed 100,000, and it is therefore surprising that the drainage leaves the land by no means perfectly fresh.

Foul Burn, which waters the Craigen-Meadows, passes first through Lochend where about 20 acres of permanent

grass and 8 acres of Italian rye-grass receive as much of it as the tenant chooses to apply. The quantity is, probably, often as much as 10,000 or 15,000 tons per acre during the growing season, besides an indefinite quantity during winter; and of course a very small proportion of the filth which it brings down from Edinburgh is deposited here. The stream flows on in almost undiminished freshness to the meadows lower down. In addition to the 20 acres of permanent grass land, there are 12 acres arable at Lochend (of which 8 acres are every year in first and second year's Italian rye-grass) commanded by a self-acting pumping apparatus. A water-wheel, driven by the stream, works a fourfold pump, delivering, when in perfect order, about 1000 cubic feet per hour, a quantity which, as it works night and day during eight months of the year, corresponds to nearly 20,000 tons, or, even assuming that only half duty is accomplished, to 10,000 tons per acre. In either case, it is plain that an enormous quantity is applied—much beyond the needs of the largest possible crop of grass.

The grass of Lochend Meadows has averaged, during nine of the spring sales at which it is disposed of by auction, £27, 12s. 2d. per statute acre. During the past year the highest price attained was £41, 17s. 6d. per acre; and from that down to £19 an acre has been realized. The Italian rye-grass on the same farm has varied in price from £32 an acre for the first year's cuttings to £25 an acre for the second year's cuttings.

Leaving Lochend, the Foul Burn pursues its course to the sea on the Portobello side of Leith; but it has for many years been diverted, right and left, to a considerable distance from the original watercourse, and a fan-shaped farm of more than 200 acres, widening out as it gets near the coast, has been thus laid out for irrigation at a cost of about £5000. This Craigentenny farm includes within its limits land of excellent natural fertility, but it terminates at its lower end in a wide belt of sheer sea-sand, which, though now equal in its annual produce to any of the originally superior plots, old men still remember as a barren shore. There is here

too, a portion of higher land of excellent natural quality watered by a pump, in this instance driven by steam power. The area this year watered thus is 8 acres, and as the engine is driven only 300 hours during the six or eight dressings which this land annually receives, the pump, delivering from 60 to 80 tons an hour, does not distribute more than 3000 tons per acre annually, a quantity which, at 1d. per ton, if ordinary sewage be taken to be worth so much, many ordinary agricultural crops would easily repay. These 8 acres of Italian rye-grass have been sold during the past year at from £25 to £36 an acre—prices equal to those obtained at Lochend, where four times the quantity of sewage is applied. It would seem, therefore, that the enormous surplussage of foul water used at the latter place fails to be of any agricultural service.

In the lower Craigentinny meadows, 190 acres receive probably nine-tenths of the Foul Burn, and, a night and day-waterman being constantly employed in its distribution, it flows constantly over one plot after another: a single dressing of five or six hours being given between the several cuttings of grass to each of the 250 plots, or thereabouts, into which the whole area is divided. The summer's grass of these beds, varying from 2 to 5 roods each, is sold by auction to the Leith and Edinburgh cow-keepers every spring, and the maximum value reached last year was £36, 15s. per statute acre. The quantity of grass for which such prices are obtained is believed to vary from 50 to 70 tons per acre. And as the means are perfected of distributing the sewage more evenly, and as the sub-soil drainage of the land improves, the quantity and price are both increasing year by year. The exhaustion is apparent anywhere the soil is being drawn more off than the water can replace it, and the grass is poorer and the yield smaller. The water is not so good as it was some years ago, but the sewage is so good that the water is not so much needed. The water is not so good as it was some years ago, but the sewage is so good that the water is not so much needed. The water is not so good as it was some years ago, but the sewage is so good that the water is not so much needed.

from the drainage of 80,000 people, or 1s. 5d. from each person annually—certainly not ½d. a ton over the enormous quantity of sewage which is here applied.

But the area is not sufficient to take up the whole of the filth brought down by the water. A much larger extent of crop could be obtained from the use of it if there were any land convenient on which it could be applied, or if there were a sufficient demand for the produce of it. The Edinburgh experience, therefore, must be quoted not as a successful example of sewage cleansed by irrigation, but rather as an instance of the largest produce raised by means of it from a limited area of land.

LODGE FARM, NEAR BARKING.

We turn now to an example of another kind, where the supply of sewage is limited, and where the object has been, from this limited supply, by means of an ample extent of land, to obtain the largest annual produce. Neither at Edinburgh nor at the farm near Barking, in the occupation of the Metropolis Sewage Company, has the sanitary result or the purity of the water been the object aimed at. In the latter case, however, it has incidentally been secured. The object having been to obtain by agricultural use the largest return from the sewage used, it became necessary to make it as clean as possible before letting it go. At Lodge Farm, near Barking, the Metropolis Sewage Company in 1866 took about 200 acres, for the most part a light gravelly soil, for the purpose of illustrating thereon the value of North London sewage, of which they hold the concession for a term of years. The land has been accordingly laid out in beds varying from 50 to 150 feet in width, with a central carrier down the middle of each, and having a slope from this carrier on either side, down which the sewage trickles to a midway furrow. The carriers are nearly as the general slope of the land shows, horizontal; the slope on either side varying from 1 in 20 to 1 in 60. The sewage is pumped from the outfall on the Thames, near Barking, through a 15-inch pipe to a reservoir on the highest part of the farm, and

at it is conducted in open ditches to ge-line carriers of these lands. These, being stopped at intervals by the of the waterman, overflow; and the, passing over and through the soil : furrows, is by them conveyed to ower slopes of the farm, over it is distributed until it either sinks her into the land or flows finally e surface at the foot of the farm. oil is too pervious, and has too hollow pen a subsoil to permit the water to far upon the surface, so that after 50 at most of surface flow it sinks, to ear only at the mouth of the main drain farm; which, nearly dry in ordinary r, pours a full flow within an hour or the sewage being applied to the fields. s of water taken here represent there- properly enough the effect of soil and upon the London sewage under such stances as the Lodge farm supplies.

n these we observe the cleansing effect l and soil in two separate instances, in f which about 2000 tons of sewage in the course of nine or ten hours or 6 acres of land; but in neither of ad the sample received more than an treatment from soil and plant together. oil of the farm is indeed too hollow and to allow the most to be made of the e. Sinking away even in the channels carry it from the reservoir, much of the : is wasted before it reaches the plant; ie remainder which trickles over the : of the grass remains there too short a or the entire extraction of the fertilizing which it conveys.

ning now to the produce of the sewage, nsidered not as a nuisance but as a le manure, it appears that 300,430 tons n 1867, used over 56 acres of land, 180 tons of Italian rye-grass were cut it area. Of the sewage, however, no a great deal was lost in the channels and land in first starting the process; and, urds the grass, we are informed that a proportion was killed by the unusual f January 1867, only 13 acres, in fact, whole extent having been in full bear-

ing; and these yielded 62 tons of grass per acre. It appears, therefore, upon the whole experience, that for every 100 tons of sewage applied, 1 ton of grass per acre was obtained, over and above the natural produce of the soil and climate. In 1868 and 1869, experiments over a considerable extent of land have been made with other crops than grass, to which alone, or to equally succulent growths, so dilute a manure as sewage appears at first sight to be adapted. A field of 13 acres of poor gravel that was in wheat in 1867, yielding then about $3\frac{1}{2}$ qrs. per acre, was sown in 1868, in the following manner:— $4\frac{3}{4}$ acres with wheat early in November, $2\frac{1}{4}$ acres with winter oats, 4 acres with rye, and 2 acres were planted with cabbage in October, which were taken off in March, and mangold sown in their place. The wheat was twice flooded with sewage, in March and in April, 450 to 500 tons to the acre being applied in the two dressings. The crop produced $5\frac{1}{2}$ qrs., and three loads of straw to the acre. The winter oats were three times flooded in March and in April, over the whole, and over a part in June, receiving in all about 500 tons to the acre. These oats yielded 8 qrs. of corn, with three loads of straw per acre. The rye was flooded twice, in March and in April, in all with about 450 to 500 tons per acre; it was cut in July, and threshed in the field, yielding 6 qrs., with three loads of straw.

If it be urged that in such an unusually dry season as 1868, good results would necessarily follow irrigation with town sewage, it must be remembered that although these crops no doubt benefited in common with those of the whole country, by the lengthened fine weather, the soil is a dry burning gravel, and no sewage was applied to either wheat or rye after the month of April, up to which time there was the ordinary amount of wet weather, without any unusual heat. The same field has been again in wheat and oats and barley, and the experience of 1869 with a cold May and June, equally with that of the hot and dry season of the previous year, bears ample testimony to the power of sewage upon this soil as a manure for corn crops. The wheat has yielded 4 qrs. per acre, the winter

less than 11 qrs. per acre, the barley ripening unkindly only $4\frac{1}{2}$ qrs. per acre ; but it must be remembered in all these cases that the field, naturally a poor gravelly soil, was then yielding its third successive grain crop. Most satisfactory results also continue to be reported last year from Lodge Farm in the cultivation of potatoes, cabbages, beet, mangold wurtzel, and other green crops. The Lodge Farm experience, confining it to its growth of grass, may be said to represent a return of 5s. annually from every individual contributing to the sewage used upon it. Supposing the water supply to be over 30 gallons a-head, each person will make 50 tons of sewage annually,

corresponding to the production of 10 cwt. of grass, worth 10s. a ton.

The experience here, combined with the tabular statement, page 76 of the analyses, of the clear effluent water, pouring from the farm into the neighbouring brook, is sufficiently encouraging for those who are interested in the cleanliness of both town and river.

We turn now to a large number of instances of irrigation where the object has been not only to make a profit but to abate a nuisance. Such are the cases of Aldershot, Banbury, Bedford, Croydon, Norwood, Rugby, Warwick, and Worthing.

Papers by Tim Bunker.

XVIII.—JOTHAM SPARROWGRASS WITH
A TILE IN HIS HEAD.

R. EDITOR,—“What’s comin next?”
exclaimed Tucker, as he saw Jotham
vgrass’ team drive up the road with a
tiles, Uncle Jotham following after as
his cane could carry him.

ould sooner have thought to see old
vgrass on a pedlar’s cart, sellin wash
and byin rags,” responded Jones.

ess he’s gwine tu set up a krokerly shop
ly the women with sass-pans and sich
nswered Seth Twiggs, with a side-long
at Keir Frink, as he stood leaning
the wall.

s-pans, you fool! The coalmen have
ond that, I ken tell yew, and use tin
ier folks. Guess ye better smoke less
e clearer, Seth Twiggs,” responded
ink.

aint gwine to du nuthin of the kind,”
ake Frink. “Ye see, Uncle Jotham
ight Tim Bunker’s disease, and is
o finish up that land round the pond.
tends that he don’t believe anything
Squire’s notions, but the fact is, there
igger Bunkerite in the district. You
l Sparrowgrass was born when the
s in the crab, and he gets at every-
leways, jest like one of them ’ere fish.”
Frink was not very wide of the mark
rd to Uncle Jotham’s disposition.
nce he made an open drain through
of his pond, and drained three acres,

before last, he has talked against
gled notions and fancy farming a little
than before. He seemed to have a
amount of satisfaction in his victory
rats and the tadpoles, but no parti-
-light in the dry land. But I could
he while that he was getting up to a
rt, sideways, as Jake Frink says. I
the paper, and found he always had

some inquiries to make about draining, how
they made tiles, how the water got into them,
how deep they had to be laid, and how they
worked. I have frequently found him down
at my horse-pond lot, running his cane into
the ends of the tiles, where they empty into
the ditch, as if to make sure that it was real
water that was discharging from the hole.
He evidently thought there must be some
trick about it, that the water could not get
into the tiles after they were laid. But there
was proof in that horse-pond lot, that he could
not very well get away from.

I have been studying that lot some myself,
this winter. It is only two seasons since the
tiles were laid there, and you would be sur-
prised to see what a change the surface of the
land has undergone. The light bluish clay
that I threw out from the bottoms of the
drains and spread around upon the surface,
has all crumbled to pieces, and got to be
about as dark as the rest of the soil. I have
noticed all along over the drains, and for a
considerable distance upon each side, the
ground becomes dry very soon after a rain,
and little cracks are visible. The land used
to be so full of water that no air got into it,
from November to May. Now the air follows
every rain, and every freezing and thawing
disturbs the whole mass of the soil several
inches deep. The mechanical improvement
of the soil seems to go on quite as rapidly in
the winter as in the summer. Jack Frost, I
guess, is about as good a friend as the farmer
has, if he would only give him a chance to
work. The tiles make a path for him, and
he uses up the coarse lumps and clods a little
better than any harrow I ever tried.

Uncle Jotham has doubtless seen these
things, though he has said nothing, and would
have probably declared any time within the
last three months, that tiles were the greatest
humbug out, in his candid opinion.

The conversation I have reported among the wisecracks of Hookertown, occurred last autumn. A few days after, I had occasion to go upon the Shadtown road to see what had become of the load of tiles. I found Uncle Jotham with three hands and a team, busy making ditches on the side hills around the drained pond.

"Good morning, Uncle Jotham. I thought you didn't believe in crockery—rather pizen to the land."

"Wal, now, Squire Bunker, to tell the plain truth, this 'ere business has been brewin in my mind ever since that horse-pond of yourn was dreened off. And when I come to let the water off here, and got my first crop on land that was once under water, I had to cave in myself, worse than the tadpoles when the water left them. You see, the taters I raised here on these 3 acres the first season, brought me a lot o' money, and that amount of money, ye see, would make tearin work with almost any man's prejudices. I found I could get the tile down here pretty reasonable, and I jest made up my mind to finish the job. Am I duin it right, Squire Bunker?"

I found he had determined to put in drains upon all the side hills sloping down to the reclaimed meadow, leaving the drains there still open. These hill sides embraced 4 or 5 acres, and were naturally a heavy clay soil, always wet until midsummer. The drains were about 3 feet deep, and I found he had got a man used to the business to do the work in the best manner. I have frequently looked over the ground this winter, and it is a charming sight to see the various coloured clays and rough clods gradually breaking down under the action of frost and rain. The results, of course, remain to be seen, but anybody who has seen the working of tiles can hardly be surprised.

"I have seen 'em workin' at Hookertown, and I know one man gets 'em down here certain to get on. I have seen 'em castin' a spell, it is a wonder what they can do. When Jotham spanned the tile-drains, you may see the world moves.—Yours to command, TIMOTHY BUNKER, ESQ.

NO. XXXIX.—JAKE FRINK SOLD.

MR EDITOR,—The spring work came on so sudden, that I didn't get time to say anything about Hookertown folks last month, and now I wouldn't say a word, if it were not for fear that other folks would get taken in just as bad as neighbour Frink. You needn't think that Jake's body has been put up at auction; but, what is about as bad, his wits have been in the market, and gone to the highest bidder. Now, you see, we have got our full share of poor land up here, and of all the land in these parts, Jake Frink's is about the poorest. He has a lot of 20 acres, lying up towards the Whiteoaks, of poor worn-out sheep pasture, not worth 2s. an acre. He has had it a dozen years, and it has not improved any under his cultivation. All he has ever done for it has been to plough up occasionally a patch of it for oats or rye. The rest of the time it has been pastured with sheep. It is a light, sandy loam, bearing plenty of coarse grasses. Jake was upon this piece of land last summer, ploughing for oats, when a fellow came along in a fine carriage, and inquired for Mr Frink—Jacob Frink, Esq., he called him. As Jake tells the story, he was considerably elevated to hear a well-dressed city gentleman calling him "Esq."

"So I holler'd whoa to old Buck and Bright, and axed him what his name might be, and where he was from; and he said:—"

"I'm Mr Smith, the senior partner in the firm of Smith, Stubbs, Darby & Co., proprietors of the patent for the improved, imperial, nitrogenized Tafeu."

"Wall, now, I'm Jake Frink, and nothing else, and don't know enny thing but English, and not much of that. I don't know what Tafeu is, never heard of it."

"Just so, Squire Frink. I should think you'd be looks of this field, that you were a stranger to the most remarkable manure ever invented for the improvement of the soil."

"Oh, it's a manure, is it!"

"Yes, sir, a wonderful fertilizer, that will grow 40 bushels of wheat to the acre, 100 of oats, and from 300 to 400 of potatoes. It is great on grass, bringing up such poor sandy land as this to a production of 8 tons

to the acre. It has the happiest effect upon fruit trees, making the wood rapidly, and adding four-fold to the By the use of this Tafeu, the produce may be doubled the first year, and doubled the second. Every man who uses the article is sure to get rich."

"You're jest the man I've been wanting for this many a year. You see I've been waiting on't, this well-nigh a dozen years, and all the time cramp'd to git along, and you've got a resate for making folks see, I shall go in."

"But I have not got the Tafeu along with me to sell this morning, I am securing agents for the use of it. I sell rights to districts, and counties, and the man who gets the right to the article makes his fortune the first year, while the man who buys will have to wait a little. For instance, if Squire Frink gets the right for Hookertown, and sells the rights, he makes £500, for we allow our agents 10s. a ton on the sales. You have in the district at least two hundred farmers, and I will want, on a safe calculation, 5 tons of Tafeu each."

"Now, we've got more'n four hundred farms in the district, and I'm the chap that will sell the stuff to 'em, if there is any market for it."

"You see," continued the fluent Mr Smith, "I sold the right to Mr Babcock of Spruce last year, and he told me he made £100; and there are hundreds more I could sell in other counties, that have made some fortunes out of our fertilizer the last season."

"And how much are you going to ask for the right to sell in Hookertown?"

"Well, we generally sell county rights for £100, and town rights for about £10, a more or less, according to size. But it is you, Squire Frink, we will let you have Hookertown right for £9."

"But Squire Frink is not a moneyed man, but he wanted to have just that amount in his pocket, and he handed it over to the oily Mr Smith, who delivered him his Tafeu to sell in Hookertown, duly signed and attested. He told Jake as he drove off, that

a cargo would be delivered at the harbour next Saturday.

Saturday came, and Jake went down with his old bobtailed mare, bright and early, expecting to see a schooner discharging Tafeu. But he found nothing but a coal vessel at the dock, and the captain had never heard of "Smith, Stubbs, Darby & Co.," and doubted very much whether there was any such firm in existence. The next Saturday came, and Jake, thinking he might have misunderstood the day, went down again, but no Tafeu vessel had arrived. Jake now began to suspect he was sold, and scolded some, if not more. His golden visions became dim, as the weeks wore away, and no news came from Mr Smith and the cargo of patent fertilizers. He has not heard from him since. Jake is particularly sore about this Tafeu business, and his neighbours, especially Jones and Tucker, when they wish to touch him on the raw, inquire for the price of Tafeu.

Now, I suppose there are thousands of pounds taken out of the pockets of farmers in just this way every year. Some of these concentrated fertilizers, I suppose, are worth the money paid for them, but the chances are, that a man gets cheated when he buys them. This is pretty certain to be the case when they are bought of travelling strangers like Mr Smith. It is worse than highway robbery, for you do not know that you are robbed until the thief is out of your reach. Depend upon it, the best plan is to buy artificial manures of no one who is not well established in trade, and who has a reputation at stake.

However, "there is no great loss but what there is some small gain," and Jake Frink claims that he has got his money's worth in experience. He says he "should jest like to see a man come along and undertake to sell him patent manure again. Would'nt he catch it!" Jake put into his yard last autumn double the quantity of dung I ever knew him to cart before, and, judging from the quantity of manure he has spread this spring, and ploughed in, he will be a gainer by his experience.—Yours to command,

TIMOTHY BUNKER.

The Garden.

FRUITS AND FRUIT TREES IN THE FLOWER GARDEN.

THE rigid rule, "a place for everything, and everything in its place," rigidly adhered to, precludes us the enjoyment of many pleasures. In a too fixed adherence to arbitrary rules, of whatever kind, there can, I think, be little pleasure. They tend to dwarf our ideas and circumscribe and narrow the limits of our enjoyments. In this way we can see little to attract in the avocations of the florist, whose object is to reduce or exalt every flower he meddles with to one particular standard. A pansy must be smooth-edged, it dare not be fringed; a primula must be fringed, and, *per contra*, dare not by any means be smooth. Verily, there is something honourable in the ambition of accomplishing by our own efforts a desired end. But still the objects of beauty are unlimited. To our thinking, there is beauty in variety. We like variety without chaos: hence we dislike the rule adopted in many gardens far too rigidly, having "a place for everything, and keeping everything in its place."

The rule itself would be all very well, provided there was a place for everything, but there isn't. The articles in a garden cannot be arranged like the stuffs in a draper's shop, more for convenience than elegance—this article by itself here, and that there. In large gardens it is much more easy of adoption, and may be justified; but in small gardens it is impossible and absurd. In small gardens the economization of space is a great object, and the rule and the practice must be to secure as much of the useful, combined with the purely ornamental, as possible. In large places it is very nice, no doubt, to talk about, and to have the flower garden by itself, the kitchen garden and the fruit garden each by themselves: they may, indeed, be made still smaller and still distinct

portions, and be quite appropriate. We, however, object to the rigid rule which forbids the appearance of a single flower in the kitchen garden, or a fruit tree out of the orchard, and other similar absurdities. Vegetables are perhaps the most useful portions of the products of a garden; they can scarcely, planting oak and beech and chestnut as simple ornamental trees, plant plums, or cherries, or apples, either of which will, in a generation, produce nearly as big a tree as the oak, and, in regard to beauty, will excel. In our shrubberies, too, why should not apples and pears, and plums and cherries, and gooseberries and currants, and nuts, be planted and grown for both use and beauty? As pretty a shrubbery could be composed of these as of any of the usual occupants. Lilacs, guelder roses, and what not, need not be necessarily banished. We only advocate the introduction of fruit trees as a source of beauty, a source of profit, and an economization of space. What more beautiful than our fruit trees when in flower, or more gratifying than when in fruit? The ordinary shrubbery is in most gardens a model of untidiness and uselessness. Therefore we say, whenever there is no other place for growing fruit trees, away with it, and form fruit-tree shrubberies, which will be ornamental as well as useful. In large gardens, where space is ample, it need not be adopted; but in small ones, where every foot is of value, we hesitate not to however, be said to be ornamental; therefore we like the practice, more prevalent in Scotland than in England, of having borders of flowers, backed by espaliers, alongside of the walks through the kitchen garden, with the vegetables in the rear, partially out of sight.

Flowers lend us, perhaps, the greatest beauty wherewith to deck our gardens, but

air charms are for the eye only. Is there beauty in Pomona that we can call to our aid, or why should we everlastingly call upon her for everything that is beautiful in the embellishments of our gardens? Fruit trees have flowers as well, and thus they have a noble season of beauty for us—beautiful when in flower, beautiful when in fruit, pleasing to the eye and to the taste, ornamental as well as useful—doubly gratifying and doubly joyable.

Fruit trees should, in small villa gardens, always be planted with an eye to the ornamental as well as the useful, and they can be easily made so. First, by judicious grouping and planting; secondly, by various modes of training or guiding into form. In place of

character. Of the many forms I shall but indicate the best; and to deal with them, then, in the order of their general importance, I shall notice—

1. *The Apple*.—One of the prettiest forms in which this fruit may be grown is that of the French cordon, in lines, as edgings to the borders, the trees being planted out about 3 feet apart and trained down to a horizontal wire, placed from 6 to 9 inches above the ground. Laden with pretty rosy apples, as these trees are to be seen in France, like ropes of onions, they form pretty objects.

We borrow from Mr Robinson's work, an illustration shewing the Ribston pippin trained as a cordon.

Apples may also be grown in the low bush



The Ribston Pippin trained as a Cordon.

commend it; and as regards size and form, it is entirely at the command of the cultivator, to which we shall now direct attention. There is no end to the variety of form which fruit trees of all sorts may be made to assume. Some are very handsome and pretty, others very weird, mere whimsical contortions, without either grace or elegance. To these we shall not allude. We should first say a few words in respect of the common standard trees—a form only to be recommended for market gardens, for large orchards, or small places where trees form an object. Large fruit trees, requiring them to be required as features, are anomination, and ought not to be tolerated either in small nor great gardens. The loss of fruit occasioned by winds, and the difficulty of gathering the same, are serious objections, besides the great space they occupy, and the small amount of fruit supplied at one time, very often to the detriment of a general succession.

A far greater supply can be obtained from a given space of ground, from well managed small trees, than from the common large ones; and to make fruit trees true objects of ornament for our gardens, it is necessary to let them assume a certain style and cha-

form like gooseberries, or as small pyramids of about 6 feet in height. Pyramid trees, it may be noted, look best planted in single lines, at regular distances apart. For small early fruiting trees, the varieties having that character should be selected, and care exercised that they are procured grafted on the French Paradise, or some other dwarfing stock.

2. *The Pear*.—This may be grown in much the same manner as the apple. It is scarcely so well adapted for the cordon, but fully more so for the pyramid. In the formation of the pyramid many are the ways in which the branches may be trained in an oblique direction, or with the points bent down in regular whorls or flat tiers one above the other, or in the winged style prevalent on some parts of the Continent. Pears may be allowed to form pyramids of from 6 to 12 feet in height, and the distance apart should never be less than (it may indeed be accepted as a rule) the height of the trees. On walls, pears should be trained after the horizontal method, which is much better suited for their development than the fan system. And to secure early free fruiting plants, especially on

stiff soils, they should be grafted on the quince.

3. *The Plum*.—This succeeds admirably as a bush, or low pyramid, or vertical cordon of 6 feet, planted at about a distance of 4 feet the one from the other. These form exceedingly handsome plants and bear most abundantly.

4. *The Cherry*.—This is the most beautiful of all our fruit trees, both when in flower and in fruit, and can readily be made to assume the most handsome forms. The prettiest of all is the vertical or upright cordon, to be seen in great splendour with Mr. Rivers at Sawbridgeworth Nurseries. How very charming lines of these trees look, fit objects of ornament for the gayest flower border! The pyramid form is also very pretty and suitable, and for single specimens, the dwarf standard. The Morello, for example, as a standard is very handsome. This fruit tree also succeeds well and has a nice appearance grown as a dwarf bush, like a gooseberry.

5. *Gooseberries*.—These form pretty ornamental plants trained on low trellis work, as screens, and in the form of dwarf standards, and the ordinary bush.

6. *Currants*.—The prettiest of all forms for these is the standard, for which they are well adapted. These planted in lines along the borders, or amongst the flowers or vegetables, have a neat and trim appearance, resembling roses so much, that we have heard it vehemently declared they were grafted on

rose stocks. To form the standard, nothing further is required than to select strong cuttings, and grow them to the required height before training, so as eventually to form the bush head. Currants may also be grown as pyramids, but they do not assume that form so easily. The common bush form is not very handsome.

7. *Raspberries*.—These can only be grown after one form, the pillar, higher or lower as appearances may dictate; quite as much fruit being obtained from canes cut at 2 feet in height as from those at 6 feet. In winter, they may be fantastically tied out in the form of arches, &c.

8. *Nuts and Filberts*.—The best and prettiest form for these is half standard or bush, with a clear stem.

9. *Strawberries*.—These may be used as objects of ornament to the garden in the form of edgings to the borders of the kitchen garden; while the variegated leaved kinds are so pretty as scarcely to be out of place in the flower garden proper.

We have omitted from the foregoing, peaches, nectarines, figs, vines, &c., as being fruits which in this country either require wall or hothouse treatment. These, although ornamental in their own way, requiring special provision, cannot be utilized to the same extent, neither do they form the general occupants of the gardens to which these remarks more particularly apply. I may revert to the more useful of them in a subsequent paper.—*A. F. Barron, Chiswick.*

THE CULTURE OF HARDY WARE FLOWERING BULBS, &c.

() The garden which is extensive and well managed, and which is capable of being brought up to a city, and which is expected all at once to be the universal and the requirements of a garden; therefore, any means of supplying information capable them to manage judiciously and

economically such portions of ground, from half an acre and upwards, will be a great boon, and one which doubtless will be supplied, whether as regards the greenhouse, the propagating pit, kitchen and flower garden, grass lawns or shrubberies; the management of plants in rooms and on rockeries, is as necessary to be known as well as the

ment of manure-producing animals, as cows, pigs, sheep, and poultry. In suggestions to be offered, the economy of space should be kept prominently in view; but, at the same time, advice should be given to adapt such portions of the garden to the cultivation of as many different varieties of fruits and vegetables as possible, also of useful and ornamental plants, and flowers, both for greenhouse and open-air cultivation.

To assist in the accomplishment of this object, I have much pleasure in presenting a few observations on the economic culture of dwarf hardy bulbs, &c. During the spring, many individuals while taking a stroll through plant nurseries and gardens, enamoured with the beauty of some of the early spring-flowering bulbs, and rarely do they procure some of these gems to come, when they at once insert them in their plant borders. As soon as they begin flowering, the leaves of such plants immediately decay: they are then forgotten and rarely again thought of till the end of spring. If they do not make their appearance at the appointed time, somebody is apt to get the blame of taking them away, the truth is, that unless a good stout stick with the name, or some other mark, is stuck in the plants, they are almost certain to be dug over, and some summer-flowering bulbs inserted in their place. While digging, bulbs are apt to be turned too deep, as they are upside down, or, as more frequently happens, get cut through the middle with the spade. This disappearance often deters the gardener from making a second investment in bulbs.

The grounds of suburban villas, a certain part of which is often devoted to grass lawns, and during the summer months are generally kept short with a small mowing machine or scythe. In these lawns many of the early spring-flowering bulbs can be inserted with effect; and there they are certain to be carefully preserved, even after their flowering season is over. None but the very hardy varieties of bulbous or tuberous rooted plants should be used for this purpose, such

as common snowdrops, Crimean snowdrops; the early dwarf white, blue, and pink squills (all being varieties of the *Scilla bifolia*); likewise the winter aconite and all the varieties of the dogtooth violet (*Erythronium dens canis*). The leaves of those just mentioned decay immediately after flowering, and are quite gone before the first grass cutting takes place. For portions of grass lawns where the cutting is not likely to be so early commenced, I would suggest the inserting of roots of all the varieties of the poppy anemone (*Anemone coronaria*), as they have a beautiful effect when flowering on grass, and the tubers are not injured by having their leaves cut over after the flowering period is past. The wood anemone (double and single), as well as the blue *Anemone apennina*, are also useful for grass culture, provided the roots are put into the grass singly; but crocuses, daffodils, early snowdrops, and other coarse-leaved plants, are objectionable, as they tend to injure the grass.

The most recent, and perhaps the best, method of growing all the varieties of spring, summer, and autumn bulbs (particularly the dwarf sorts), is on a rock-work entirely devoted to their culture. The foundation of this rock-work should be a raised irregular mound of properly prepared soil, well drained below, and raised to the height of 3 or 4 feet. The surface to be constructed with stones about 2 inches thick, and from 8 to 10 inches deep, arranged in compartments of various sizes and shapes, each compartment to contain one species or variety. Rock-works arranged as described are certainly the best way to preserve most of the spring bulbs, such as *Leucojum vernum*, *Scilla siberica*, *S. præcox*, *S. bifolia major*, *Puschkinia scilloides*, *Iris reticulata*, *Sisyrinchium grandiflorum*, *Tritelia uniflora*, *Narcissus minimus*, white and blue grape hyacinths, all the species of *Corydalis*, with numerous others, as well as those recommended for lawn culture. With the bulbs, here and there, may be placed plants of *Dondia epipactis*, *Eranthis hyemalis*, *Saxifraga oppositifolia*, and all the varieties of *Hepaticas*. These plants are all

early flowering, and ought to produce a fine effect amongst the bulbs; and, being early flowering and dwarf, are apt to become a nuisance in the ordinary flower borders during summer. When the flowering of the bulbous plants is over, the roots will be found to be several inches under the surface; therefore the compartments containing them can be filled during summer with shallow-rooted annual plants—such as the different varieties of *Verbena*, dwarf *Lobelia*, *Clintonia*, *Leptosiphon*, *Gilia*, *Nolana*, *Nemophila*, dwarf *Tropæolum*, *Virginian Stock*, &c.; or, what is still better, foliaged plants, or dwarf greenhouse flowering plants in pots, which can be placed on the compartments without in the least injuring the dormant bulbs. If it is thought that the constant watering such plants require may injure the bulbs beneath—which, however, is hardly likely to be the case in raised rock-works—such plants as *Mesembryanthemums*, or some of the innumerable variety of succulents now in cultivation, would answer the purpose

equally well, and require little or no watering. During autumn, after the pots have been restored to the greenhouse, the surface of the earth in the compartments should be slightly stirred up, having a little fresh soil added; and, if so treated, the bulbs will come up in increased tufts, year by year. Although not absolutely necessary, if the amateur chooses to lift the roots and replant them with fresh soil, his trouble will be rewarded by the increased vigour and beauty of the blooms. The varieties of spring-flowering bulbs are now very numerous; and as all remain in the soil during a series of years, it will be found that the rock-work cultivation of them will permanently preserve many varieties, which cannot be cultivated with impunity in the ordinary open mixed borders, unless planted in beds specially set aside for them. Even then, the roots are more apt to decay than they can possibly do by rock-work cultivation, where they are certain to remain comparatively dry.—*J. M'Nab, in the Villa Gardener.*

THE PARLOUR GARDENER.

INTRODUCTION.

WHO in our days does not love flowers, and who does not like to do a little gardening? Assuredly, not you nor I, dear reader, nor any of our acquaintance. But the love of flowers, the taste which of all others affords the greatest amount of elegant and harmless pleasure, is by many deemed to be an unfortunate one, seeing that it is out of their power to indulge it. In your case, sir, for instance, the burden of business, often-times a terribly heavy one, which it is not in your power to shake off, absorbs all your time and strength. In the country, where, for years, my friends have been doing so much, and where you have been so long, my friends, who share your taste for flowers, are condemned to a sedentary existence for the want of the most precious

of all possessions—health. Time was, when a few favoured individuals possessed what was called a garden in the interior of the city; but, at best, those gardens had, as a celebrated wit expressed it, “the shut-up smell.” But now-a-days nothing of the kind is to be found; the opening of a street, the laying out of a square, has dispossessed them of the pent-up treasure, or else the ground has become of such value for building purposes, that it is sold at so much the square foot—a price sufficient almost to cover it with gold. Nor is this the case with the capital alone; other cities less crowded—all towns, in fine, of sufficient consequence to grow—will soon be without a single garden, large or small, within their limits; the flower, vanquished, retreats before the building stone. Happily it is not indispensable to possess a garden,

ther large or small, in order to have flowers, and to enjoy the tranquil delight afforded by the attentions one bestows upon them, and which one experiences in watching the various stages of their development.

Suppose yourself, for instance, after a severe illness, confined to your room by a long convalescence, which it is not in the power of any one to abridge. Even if you were the owner of a garden, you would then only admire its flowers at a distance, through your window panes. Then it is that you would feel all the value of a chamber-garden, the flowers of which could be renewed at small cost every few weeks; taking care to admit into it those only which, from their delicacy of perfume, or absence of smell, would be sure not to be injurious to your health.

Suppose this enforced seclusion to have begun in the month of May, a season at which a garden possesses the greatest attractions; suppose your circumstances such as to forbid your indulging in the luxury, little expensive as it is, of a flower-stand—in that case, here is a receipt for gardening without earth, without water, without so much as a lower-pot even; in a word, without any expenditure beyond a mere trifle.

Procure from a gardener a fresh bunch of a thick-leaved plant, named *Rhodiola rosea*, in English the *house-leek*, that will cost you at most a few pence. At the beginning of June, the stalks of the *Rhodiola* are garnished along their whole length with fleshy leaves, and terminated by a bunch of buds, as yet but little developed, and disposed in a corymb. Drive into a wall two hooks, about half-a-yard apart on a horizontal line; and upon this support lay the stalk of *Rhodiola*, without tying it in any part. This is all that is requisite for a curious experiment in parlour gardening, which cannot fail to awaken your interest and afford you amusement. Nature having endowed the *Rhodiola* with the faculty of living, drawing its nourishment from the air alone, which it decomposes by means of its leaves, you will see it day by day, hour by hour, strengthen, turning upwards at the end where the flower buds are, and dropping its leaves at the lower part of the stalk, where they will

dry up and fall off, one by one, while those of the upper part will preserve their freshness and become more numerous. Finally, it will bloom, and present you with a bunch of rose-coloured flowers as perfectly developed as if the plant had grown in good earth constantly watered.

When these flowers have faded, cut them off, and cut off also the lower part of the stalk. After this preparation, plant it in a pot filled with ordinary garden earth, which you must take care not to water too often. In this situation, your stock of *Rhodiola* will take root, and will, before autumn, form a tuft of young shoots which will all bloom the following year, and supply you amply with the means to repeat the experiment just described.

The *Rhodiola* is called by the French *St John's herb*. You will wish to know, perhaps, my dear lady, the reason for this name. We will cheerfully satisfy your curiosity. In many parts of France the *Rhodiola* grows abundantly on the outskirts of the woods, and there the experiment of its flowering without earth and without water is repeated every year in almost every peasant's cottage. If it blooms *before* the feast of *St John the Baptist* (the 24th of June), they draw from this circumstance a favourable augury with regard to the success of a project or the accomplishment of a wish. In the contrary case, the presage is regarded as unfavourable. I must not omit to add that this, which in the middle ages had truly all the reality and power of superstition, is now no longer any thing more than an amusement of young girls, in whom the oracle of *St John's herb* inspires no more confidence than the white daisy.

Should it so happen that you wish to do a little gardening in your room, without being able to afford even the very small expense that the purchase of a bunch of *Rhodiola* requires—a thing which may happen to any one—spend nothing at all. Ask some kind acquaintance to procure for you a tuft of the yellow *sedum* (stone-crop). It is a very pretty wild plant, which bears, in place of leaves, little green excrescences elegantly set into one another. Each stalk forms part of a tuft composed of a great number of stems coming out from a common centre, and each b

on its top some star-shaped flowers of a beautiful golden yellow. Fix a strong pin into the wall-paper of your chamber, and hang a tuft of stone-crop to it by a thread, which you must take care not to tie too tight. In a few days the stalks will curve upwards and stand upright, and the flower buds will all open exactly as if the plant had not been taken from the place where it first grew.

You see now that there are flowers for everybody without exception; and of this you will become more fully convinced if you will only peruse, with a little indulgent attention, my PARLOUR GARDENING, the first chapter of which I beg now to lay before you.

CHAPTER I.

THE GARDEN IN THE ROOM AND THE GARDEN AT THE WINDOW.

Watering—Temperature of the Water for Watering—Effect of Cold Water on Plants cultivated in a Room—Warmth—Advantages of the Heat being equal Night and Day—Light—Ventilation—Cleaning of Broad-leaved Plants—Same of Narrow-leaved.

It is not always easy to cultivate ornamental plants in an inhabited room; but, far from complaining of this difficulty, we should, on the contrary, congratulate ourselves on it, for it is a great pleasure to do a difficult thing and succeed in it. To be successful in Parlour Gardening, nothing is requisite but care and patience; much of these is necessary, and so much the better—this sort of gardening belonging peculiarly to those who have a great deal of leisure. The extent to which Parlour Gardening can be carried on, the kinds and variety of plants that it may embrace, the times of the year in which we can occupy ourselves in it with the most pleasure and success—all these vary according to the space we have, and the richness of the situation for our experiments. I shall, however, be confined to the limits of the present chapter, and shall only present to you a few hints of the most ordinary nature. You may wish for our hints in some cases, and we shall examine separately the *garden in the room* and the *garden at the window*—these being the two natural divisions of this subject.

Separate chapters be will devoted to the garden on the mantel-piece, the garden on the *étagère*, that on the flower-stand, and that in the portable green-house. The different methods of propagation—by seeds, by slips, and by grafts—will form subjects of so many separate chapters. They are the most delicate and the most amusing of the operations of Parlour Gardening. We shall also touch upon in detail the parlour aquarium.

We shall consider gardening under all the aspects that it can present—on the verandah, between the double windows, (which will be converted into a miniature conservatory), and on the terrace (which, even when it is not very large, can be made into a real garden), where we can have flowers all the year round, in less number, doubtless, but as beautiful and as various as in a well-kept parterre.

WATERING.

In order to cultivate ornamental plants with success in a room, we must reflect that they have their wants and their enemies; and we must satisfy the one and protect them from the other. Plants confined within our dwellings have need of earth suited to their temperaments; and it is easy to procure it. They require also watering; some rarely and sparingly, others often and profusely, but always with water of the same temperature as that of the earth in which they are placed—this being a very important point, upon which most people who have flowers in pots in their chambers are perfectly ignorant. You ladies like a comfortable degree of warmth; so also do your plants; and nothing is more agreeable, and at the same time more healthy, than a good temperature within doors when the cold reigns without. Yet, mark what frequently happens: some beautiful camellia is your delight. To judge by the profusion of buds with which it is loaded, it promises a splendid bloom in January. You have been enjoined not to fail to water it evening and morning, and this injunction you punctually fulfil. But in what way? You go to the dining room sideboard for the water pitcher—you find it empty—you have it replenished

e filter—the temperature of this water
st icy—you pour it upon the roots of
amellia. Suppose some one was to
cy water upon your feet—the shock
make you cry out. Your camellia says
g, but it does not suffer less. Its sap,
as in full activity, slackens—stops ; and,
may begin to flow again, all the buds
one after another—not a single one can
. You are astonished at this, and say,
not my fault.” In Sir Walter Scott’s
te,” the gardener of the Shetland Isles
rised that his apple trees have frozen.
ys, as you would say, “It is not my
I watered them all the winter—with
water.” It is the same error reversed.
mber, then, that in watering any plant
ver, cultivated in a pot in a room, the
quisite is, that the water you use be of
me temperature with the earth in which
ant grows.

ou have occasion to visit a greenhouse,
: should happen that you pay a little
on to the manner in which it is managed,
ill remark that it always contains a reser-
f water intended to water the plants
This water, from the circumstance alone
remaining in the greenhouse, takes
me temperature with it before it is used.
s an example that must be followed.
: evening, place in the chamber a vessel
ning the quantity of water necessary to
the plants next morning : this water
ie earth of the pots will be of the same
rature.

WARMING.

to heat, that is not what is most impor-
or the health of your plants ; the greater
er of those which you can have in cold
er will always be warm enough in your
, provided it does not freeze there.
ssential point is, that they should not
y sudden alternations from heat to cold,
hat there should be as little difference
sible between the temperature of night
ay. In this respect it is not difficult to
rem satisfaction, while at the same time
e making yourself comfortable.

LIGHT.

But there is another element of which they
all have as much need as of heat ; that is
light. Do not be afraid of inconveniencing
yourself a little, of spoiling the symmetrical
arrangement of your furniture, in order that
your flower-stand may receive as much light
as possible, and be placed as near to where
it comes in as the gardeners by profession say
ought to be done, and as they do in their
greenhouses. If you travel in Belgium, in
Holland, in the north of Germany, a country
where Parlour Gardening is very much in re-
pute, you will see that all who have flowers
in their rooms (and everybody has), place them
conspicuously upon *étagères* painted green,
which gives to entire streets the appearance
of a floral exhibition. There is a street in
Brussels, where, if you wish to see a continual
display of gardening and botany, you have
nothing to do but to walk along and look at
the windows on each side. And you might,
in your walk, get some useful hints with re-
gard to the kinds of ornamental plants you
wish to cultivate in your parlour.

VENTILATION.

After water, heat, and light, the continual
renewal of air for your plants is most neces-
sary. If your room is warmed by a good
open fire-place, which draws well, and gives
you a clear fire without smoke, so much the
better ; the draught of the chimney renews
sufficiently the air of the apartment : both
your own health and that of the plants must
be the better for this. Do not put your plants
in a room in which the chimney smokes ; or
in a place warmed by a stove or furnace ; they
will have too little air in this latter case. You
will say, that in the greenhouses and conser-
vatories it is by various systems of hot-water
pipes that a proper temperature is kept up ;
and that the plants do well. This is true ;
but alongside of the hot pipes are pipes for
ventilation, bringing continually into the green-
house the air from without, which is warmed by
its contact with the hot pipes before it mixes
with the interior air ; and the freshness of this

interior air is thereby maintained. Not so in a chamber warmed by a stove.

CLEANING.

Plants in a room have really but one enemy—the dust necessarily raised by sweeping. Those plants, such as camellias, kalmias, and rhododendrons, which have leaves both large and thick enough for the process, ought to be wiped at least twice a week with a moistened sponge. As to those whose leaves are too small to admit of this sort of cleaning, as the *ericas* (heaths) and the *epacris*, you must

proceed in the following manner:—Fill a watering pot, the rose of which has very fine holes, with water of a proper temperature; incline each pot containing a plant to be cleaned separately over the sink, and then with the watering pot, turning the plant round all the time in every direction, pour a fine shower, which will have all the effect of real rain. By this means you avoid wetting the earth of the pots to excess, and the plants will be perfectly freed from dust.

These general attentions are applicable to all plants that can be cultivated in-doors.

GROWING FERNS IN GLASS CASES.

HOMES of taste invariably contain many objects of natural history; and in such homes blessed with the society of the fair sex, the force of nature is often displayed in the shape of window plants, and glass cases devoted to the growth of plants remarkable for the beauty and markings of their leaves, and which will not sustain without great injury the dry atmosphere of a dwelling-room. Amongst these, ferns always form the largest proportion. The very fact that so many plans have been tried, and so many articles have been written upon this subject, is a proof of its popularity; indeed, so much has been done that it is sometimes said, nothing new can be written. I cannot accept such an assertion upon any subject connected with the practice of horticulture; and as the cultivation of ferns and ornamental-leaved plants in cases is rapidly on the increase by those residing in cities and towns, and also the occupiers of our urban villas, where oftentimes the space allotted for the garden is insufficient for the erection of a glass structure, I venture to hope the following remarks may be useful, if not to the adept and practised cultivator, at least to those who are making their first attempts to improve themselves with the wants and requirements of these gems of Nature.

Ferns merit to be recommended themselves to

persons of refined taste for decorative purposes, on account of the beauty and grace of their outline, and from the ease with which many of them adapt themselves to circumstances. They may be brought to decorate the drawing-room or sitting-room, uncovered, whilst others require a moister atmosphere, and must be enclosed in a Wardian case. Under this most admirable and invaluable help, the charms of a fern house may be enjoyed upon a small scale, even in the middle of winter; and further, let me add, few objects are capable of becoming greater sources of instruction than the miniature wilderness often displayed in a case of well grown ferns; for here, by his own fireside, the cultivator may carefully observe and note the gradual development and variations which these assume.

In preparing a fern case, great mistakes are often made by beginners placing in them ornamental stonework, and pieces of coloured marble, miniature statuary, fossils, and other things, to form the prominent features; these not only do not harmonize with the plants, but are not genial to their development. Small pieces of sandstone may be used with advantage, in sizes proportionate to the case, but they should be used with the view of ultimately becoming clothed with ferns, or

other plants. Respecting the size of the Wardian case, no definite rules can be laid down, as they are so often made to fill windows or other places; so that in this respect they are quite the children of circumstances, and, in my opinion, size is of little importance as an aid to success. My impression is, that usually these structures are not sufficiently large for the number of plants most people attempt to grow in them; and over-crowding is a fatal error. Any person having determined to commence plant culture in a Ward's case, must first of all determine upon the size. This done, a wooden box, or a box of some other material, should

unnecessary for me to dwell upon this particular. The one thing deserving special attention, in selecting a case, is not to study overmuch the ornamental appearance of the structure; not that I advise any one to abjure an elegantly made case, but I do certainly deprecate its decoration with useless ornaments. Depend upon it, a plain elegant structure produces greater satisfaction than an elaborately ornamental one, in which it often happens the plants can with difficulty be seen; and indeed, in such a one, plants do not thrive.

The practical operation of planting must now be taken into consideration; and firstly, let the soil-box be well drilled with holes, so



A Group of Ferns in a Fern Case.

be made to put the soil in; I however prefer wood for this purpose. The object of this box is, that the plants can be arranged in it with more convenience, for the renewal of soil, or the replacing of any plant which may have died or proved unfit for cultivation. This method is also preferable, because the box can be lifted out of the stand, and taken away to some suitable place for the necessary work to be performed. The stand and case may be constructed of any material. Our illustration represents a small one, made of zinc and glass; but cases are to be purchased in an infinite variety of patterns and materials, at very reasonable prices; so that it is quite

that superabundant water does not lie in the soil to the detriment of the roots; and as this box should be provided with short legs, it thus allows space between it and the bottom of the stand; but it will only be upon rare occasions that much water finds its way into this place. A good share of drainage material should be used; and for this purpose charcoal, in moderate sized pieces, is excellent, and possesses the advantage of lightness. Over this put a layer of sphagnum moss; next, the soil, which should be of fibrous peat, with a liberal addition of silver sand, and a very small portion of loam. Blocks of sandstone, suitable to the size of the case,

should be used to form miniature rocks and dells, and upon the prominent rocks many elegant creeping ferns may be grown.

The following species of ferns form a very interesting group in a case sufficiently large to receive them without crowding: *Acrophorus affinis*, *Pteris scaberula*, *Niphobolus rupestris*, the British *Hymenophyllums*, and *Hypolepis distans*, for growing over the larger rocks. For planting upon their tops, and in the miniature glens, *Adiantum cuneatum*, *A. formosum*, *A. reniforme*, and *A. capillus-veneris*, *Anemidictyon Phyllitidis*, *Asplenium dimorphum*, *A. marinum*, *A. viviparum* and *A. formosum*, *Davallia tenuifolia*, *Doodia lunulata*, *Menisium simplex*, *Polypodium pectinatum*, *Pteris geraniifolia*, *Blechnum occidentale*, and *Cheilanthes alabamensis*; whilst for suspending in small rustic baskets from the roof, *Goniopteris*

gracilis, *Adiantum assimile*, *Asplenium flabellifolium*, have a beautiful effect. Some prefer bolder foliage, to form a greater contrast, and, in that case, some of those named may be substituted with such plants as *Dracenas*, *Alocasias*, *Anthuriums*, or *Crotons*; and, in addition, the surface should be planted with a close growing club moss. Rules for the management of Wardian cases are very apt to mislead. The greatest success will certainly attend those who love their plants the best, because they will be watched and studied, until their wants and peculiarities become as "familiar as household words." Let all who are learning, and all who wish to be successful, give air regularly, but moderately; do not allow the full blaze of the sun to play upon the leaves of tender ferns, and above all, beware of over-watering.—*B. S. Williams.*

NEW AND RARE PLANTS.

From "THE VILLA GARDENER."

NOTE BY THE EDITOR.

[Under this heading this new publication proposes to give descriptions of such plants of recent introduction as have been found, *after proper trials*, to be really worthy the attention of the owners of Villa and Farm Gardens. As the Editors state that they hold themselves responsible, unless otherwise stated, for the opinions expressed in regard to the plants noticed in this section, it will be of great value to amateurs.]

tinted, with a centre in many cases profusely

I.—*PHALÆNOPSIS SCHILLERIANA*.

THIS beautiful representative of the moth orchid (*Phalænopsis*) family, was found in Manilla, and was introduced into this country in the spring of 1861. Since that time it has been cultivated in the plant houses of this and other countries with a uniform success, which could not be calculated or any of its previous compeers. To a most profuse inflorescence must be added the distinguished quality of highly ornamental leaves, veined and freckled in all sorts of ways with green and white. When in bloom, the species is particularly captivating, producing long



Phalænopsis Schilleriana.

spotted. The narrow bridge springing from

the base of the column, that supports a huge dze-like labellum, is very striking.

Our representation is taken from a photograph of a plant grown and lowered in the choice collection of Mr Miln, Arbroath, N.B., and does much credit to the cultural skill of his gardener. As will be observed, it is grandly flowered, and has noble leaves, sufficient to support such a state of inflorescence, which may have been equalled, but has not been extelled, in this country. It is grown in one of those perforated pots, in sphagnum, charcoal, and potsherds, and is treated to a stove temperature. Unlike its white-flowering compeers, which have special enchantment about them, this species can withstand more cold. Any one having a few choice Indian temperature plants, such, as Caladiums, Begonias, and such like, can grow this plant, and flower it with very ordinary attention; and it will grow and flower well among such stove plants as those named above. Good plants are procurable at three guineas, that will flower after a season's growth; and, supposing it may be considered an extravagant sum in the eyes of many of our readers, those who invest, and have the house and the temperature for cultivation, will not consider the money ill spent.

2.—DWARF CHRYSANTHEMUM FLOWERED ASTER.

No annual can vie with this beautiful form of Aster. All the sorts are of first importance for decorating gardens, and are within the province of the humblest villa gardener. A sixpenny packet of seeds, carefully tended, will yield an amount of plants that will furnish a choice little bed on their own account, or they can be planted in threes in a mixed flower border with great effect. A little artificial heat to set the seeds agoing is of importance for inducing strong plants; but a warm sunny border adjoining a wall will be found best for raising

and nursing the seedlings, until of sufficient strength to be planted in their permanent flowering quarters. The subject of our illus-



Dwarf Chrysanthemum-flowered Aster.

tration, kindly furnished us by Hooper & Co., gives some notion of the perfection which the plant is capable of being reared to; and it must be granted, where good cultivation is the



Fig. 1.—*Silene pendula ruberrima* fl. pl. Shewing habit of growth.

order of the day, the engraving is in no way exaggerated. If good plants for pot culture be desired, all that is necessary is to select the strongest seedlings, plant them in small pots at first, and then, when the pot is full of roots, transfer them to pots, say of

inches diameter, for flowering. The plants must not be treated to a greenhouse, or even a frame temperature, but plunged to the rim in exposed, but not windy, situations, and



Fig. 2.—*Silene pendula*—Flower natural size.

they will go on and flower to any one's content. Of course, when grown in pots, the plants are portable, and come in well for the united admiration of friends and visitors, either in their place in the greenhouse or

3.—*SILENE PENDULA RUBERRIMA*.

The two engravings (figs. 1 and 2) from Hooper & Co.'s collection, represent a decided acquisition to this branch of the family of Clove-worts. If this novelty at all maintains the high character which it bears, it will be one of the most charming annuals of the year.

4.—*SOLANUM (CAPSICUM) PRINCE OF WALES*.

Mr Carmichael, the superintendent of the Prince of Wales's gardens, at Sandringham, has just made known a new variety of *Solanum* (*Capsicum*), which he has named after his Royal Master. The foliage is described as of a beautiful *Euphorbia*-like green, and the fruit a bright golden yellow, hanging in great profusion from all parts of the branches.

The habit of the plant is singularly striking, and the general appearance very beautiful;



and from not growing tall it is well adapted as a decorative plant for the dinner table. We are indebted to Messrs James Carter & Co. for the engraving of this elegant plant.

Work in the Garden during May.

From "THE VILLA GARDENER."

May has come round to us again like an old friend and a pleasant thought. It is, or so we may be, soft, rich, pure and satisfying. Who does not go a-gardening in May? Certainly no one does in a villa. On the contrary, see with what steps men hasten from their offices in town to the keepers and dressers of their gardens in the country. Amid these elysiums, sacred to love and they forget the latest quotations on 'Change, and the last bargains, until they become partially blinded to the freshness and sweetness of all that is around them. This is a delightful sort of Maying business men may indulge in; and few pleasures equal, none exceed, the delights of gardening this month. The weather and the work, and the accompaniments of both are irresistibly

5.
The first work for May is suggested by the tender growths of May, and the spotlessness of her

Traces of winter in a garden in May are at spots on the cheeks of beauty, or grease on a bridal dress, or a harsh note in low sweet

They are out of tune with the month, and are instantly got rid of. No dead leaf nor no withered flower, no weed, no green slimy walk nor road, no worm cast on grass or no dirt or rubbish must be seen anywhere in gardens in May. Without spot must be the rule on the lawn, gravel, flower-beds and borders, berries, and kitchen garden, for the month of

KITCHEN GARDEN.

seems a long leap from all this to cabbages; practice the transition is easy and natural. Be careful kitchen gardens and their crops should be scrupulously clean as any other department, when they become quite as interesting, and at last equally beautiful. Hoe and earth up the earliest sowing, or plant out another row or two, if they are ready in summer. Most people prefer cauliflower for summer use, being so much sweeter and more tender.

Make another sowing of cauliflower and green brocoli, and plant out cauliflower plants in feet apart, and about 15 inches from plant to plant in rich soil. The ground can hardly be too rich for all these crops, as the faster they are grown the better and finer, more delicate, as well as larger,

they become, and the rate of growth is mostly determined by the richness of the soil.

Brocoli, &c.—If any of the late sorts were grown last year, they will be nearly all used during this month, and the ground should at once be richly manured and deeply dug, and cropped with such crops as peas, beans, late carrots, or turnips. Advancing young crops of brocoli should be pricked out into beds, 3 inches from plant to plant—to remain in these until finally planted out. Another sowing of White Cape, Grange's Early White, Veitch's White, and White Sproutings, should be sown about the beginning or middle of May. Another small sowing of Brussels sprouts and savoys may be made, as they often come in useful for planting on potato ground. The plants must be carefully pricked out, as directed for brocoli. In fact, all the Brassica tribe should be sown thick, and then pricked as soon as they can be fairly handled—that is, have formed two proper leaves, beside the seed cotyledons, as this treatment makes them strong, and forms a greater profusion of roots.

Potatoes.—Destroy weeds, keep the soil loose by frequent hoeing, and earth up the early crops. This earthing up requires a good deal of care. Many draw the earth right up to the stems on each side, exactly like the steep narrow ridge of a house. This pointed ridge necessarily throws most of the rains clean off the ground containing the tubers into the bottom of the furrows between the rows. The best mode is to leave a flat space, not pointed, on the top of ridge. The rain will then penetrate freely to the potatoes, and develop them fully, and more rapidly.

Carrots, Parsnips, Beet, &c.—Keep free of weeds by frequent hoeing, and thin the plants as soon as they are large enough to handle—carrots to 6 or 9 inches apart, and parsnips and beet to a foot from each other in the rows, leaving the strongest plants to stand.

Onions.—Thin out to 6 inches apart in the rows, and save the thinnings, by laying them in by the heels, for summer use, either to eat uncooked by themselves or in salads, or for culinary purposes. It is a bad plan to leave the onions to be thinned out as wanted. It is much better to do all the thinning at once, and save the plants for use by heeling in.

Leeks.—Plant out on rich ground, 8 inches by 9, in the bottom of drills a foot deep.

Turnips.—Sow such varieties as White and Red Dutch, Stone, and Yellow Malta every fortnight.

Peas.—Sow thrice during the month, in single file, among other crops, if possible; if not, let the rows be at least a yard apart. Better peas can hardly be grown than Veitch's Perfection, Ne Plus Ultra, Champion of Scotland, Auvergne, and British Queen. Among shorter varieties, Knight's Dwarf Green Marrow, and Hair's Dwarf Green Mammoth are among the best. All the advancing crops of peas must be earthed up and staked as soon as they are 4 inches high. The earthing up should not be too pointed, and the staking should be done strong and straight. The stakes will have to be thrust into the ground for the tall varieties, from a foot to 18 inches. Few things are more trying than the wreck of a pea crop from imperfect staking. The distance apart will be determined by the size, number of twigs, and length of the pea-stakes, as well as the height of the pea grown. The most common mode of staking is the vertical (see fig. 1).



Fig. 1.

Some, however, prefer the stakes more or less inclined; and when the stakes are long or scarce, and the peas not very tall, the inclined mode

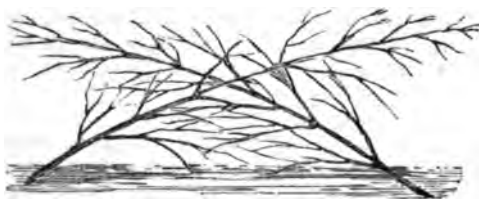


Fig. 2.

(fig. 2) effects a great saving of stakes, and answers quite well. From 6 to 9 inches is generally sufficient distance for the stakes apart on the vertical plan. The double row of stakes is not to confine the pea within them, but to keep up both sides and strengthen the frame-work. The peas fruit outside the stakes.

Beans.—Plant Green Windsor and Monarch Long Pods in rows 18 inches or 2 feet apart, 4 inches from bean to bean, and 6 inches deep. Plant French beans on a warm spot—such varieties as the Canterbury, Black Negro, and Fulmer's Forcing in rows 4 feet or 30 inches apart. Likewise a row of *Scarlet Runners* to make a border. Long stakes 6 feet high, 6 inches apart, will support these are both lower than the French beans, and have a place in every garden.

Salads.—The following may be sown fortnightly, such varieties as All-the-year-round, Grand Admiral, and Victoria cabbage-lettuce, and Brown Bath, and Paris White, and Green cos. Sow also green moss-curbed endive, two or three sorts of radishes, and mustard, and cress every week. Sow Round

spinach once a fortnight. Plant out a few plants or sow a few seeds of ridge cucumbers, vegetable marrows, or gourds, under a hand-light, cloche, or Rendle's plant protector. (See pp. 46 and 91, where they are described.)

Celery.—Prick out the plants sown last month, grow under glass until the end of this month, and then plant out in trenches a foot wide, 28 inches deep, and a yard or two feet apart. The bottom of the ridges should have at least 6 inches of the very best dung turned into it, and the celery must be carefully planted and plentifully watered. Sow such varieties as the Mammoth White and Red in a sheltered place for a late crop to stand through the winter. Keep all the crops clear of weeds.

Water newly-planted vegetables copiously until they are thoroughly established. Vegetables should never have a check in their growth. All checks involve a loss of time, and with almost equal certainty a lowering of quality. If you want to have a sweet crop of large, and in every respect good vegetables, keep them always growing.

THE FRUIT GARDEN.

Look over gooseberry and currant bushes, and pick off every grub or caterpillar that may be nestling so snugly, and yet gnawing so cruelly, at the heart of their tender shoots or leaves. One grub destroyed now is of more service to the tree than a score or more captured by and bye. Prompt destruction must ever be our rule with insects. To use an Irishism, they should be kilt before they begin to live, if we would have our plants perfect and without blemish. Nauseate the feeding grounds of green-fly by dashing a mixture of dry soot, lime, and guano upon young and tender shoots of cherries, plums, and peaches that are infested by such vermin. This will often check their ravages. Even dry dust bothers their swallowing and digestive organs, and occasionally makes them flit to cleaner boarding quarters. These remedies are not very elegant, but they are cheap, and if washed off in a few days they do the trees no harm. They are less offensive to our olfactory nerves than tobacco water or putrid soap-suds, which are sometimes used for similar purposes. The latter are simply abominable within whiffing distance of the drawing-room windows, and ought to be banished if possible out of villa gardens. Quassia tea, prescribed by Mr Rivers, is thus made, and is not offensive:—Boil 4 oz. of chips in a gallon of water for fifteen minutes, and then dissolve 4 oz. of soft soap in the bitter drink. A dip or a splash with this, when cool, from the syringe, is death to the green-fly, of any colour, strength, or size. Gishurst's compound, at the rate of 2 oz. to the gallon, is not equally effective, but will also kill. These latter dressings not only rid us of the fly and other small fry, but protect the trees from the birds. Yes, it is of no use blinking this matter; we must protect ourselves, or rather the produce of our gardens, from the birds, if we want to eat any of it ourselves. I agree to share

with them. Their song, their beauty, their winning ways, are worth much ; but they are not worth all our fruit. The worst of the birds, too, is, they begin their feasting so early. Before we have even thought about fruit, they are down upon and devour it. The fact is, they are not at all particular ; so, if they cannot have a ripe cherry or plum, or gooseberry, they just content themselves with a score or two of fat plump buds in lieu of the ripe fruit. And as we don't care for buds, the birds have an undue advantage over us. They eat our fruit in embryo, and could they have it all their own way, we should never get beyond a spectral or embryonic dessert. Hence we must do battle with the birds for the buds. But how shall we proceed ? The birds are swift, numerous, up in the morning early ; something highly ubiquitous about them. Kill them ? O fie ! After that divine song this morning, that made you think of angels' music all day long ! No, no ; that will never do. Pepper the buds, when glistening with dew, with dry soot and a little dry guano and quicklime, and watch the result. It is better than any play to see the sage looks of the birds when they find that they have been taken in and done for.

Disbudding and Disrobing the Trees.—Let both proceed gradually, and be completed, or nearly so, during the month. Occasionally, May is so cold and bleak that it is not safe entirely to remove the protection from the trees until the beginning of June. The upper boughs under the coping might be left till then. For a similar reason, disbudding, or the defoliation of the tree, must not be carried to any great extent during cold weather. The young shoots, as they grow and stand out from the wall, afford considerable protection to the tiny fruits that nestle beneath them. It is also well to allow a free start to the tops of trees early in the season, as every top-growth says plainly to some hidden root, Wake up and feed me ! and the roots hear and obey the call of the shoots. But suppose a great proportion of the shoots are taken off or disbudded, and a frost-bite should overtake the remainder, and blister them with cold chills ? It is wise to have a reserve to fall back upon, and good practice to keep young branchlets enough to keep the roots awake. When all danger of frost stunts are over, we can easily reduce the shoots to a proper minimum, for then those left will have growing force enough to monopolize all the sap sent forward by the roots, or draw it within reach of the sap-consuming fruit. Some writers recommend thinning the flowers of peach, nectarine, cherry, or plum trees, in the open air. It is safer to let them alone. As soon as the fruit is fairly set, all the deformed, badly-placed ones should be removed, and inordinate clusters thinned, leaving always the largest fruit. But beyond this, leave fruit thinning alone for another month. Possibly accident or nature may have done it for us before then ; and if not, we will give further instructions. Apples, pears, or cherries, as bushes, pyramids, and cordons, had

better go unstopped until next month, upon the principle of developing activity of root.

As already stated, attend to the stopping and the training of vines, nail or tie in the leading shoots, and stop the side shoots at one leaf beyond the bunches.

Water newly-planted trees, and cover the surface of the soil with from 2 to 4 inches of rotten dung, moss, tan, coco-fibre refuse, or any water-keeping-in heat-keeping-out, slow conductors.

Water strawberries thoroughly in dry situations with sewage or manure water. A good soaking will double the weight, and improve the quality of the forthcoming crop. A moist, cool, rich root-run are the sure and certain means of reaping a plentiful harvest of luscious strawberries.

No weeds nor insects—no loss from birds—should be the mottoes for the villa fruit garden throughout the month of May.

THE FLOWER GARDEN.

Presuming that the villa garden may have its beds or borders for annuals and half-hardy perennials furnished on what is termed the grouping system, and, as all the world knows, this is the month for planting out such plants, I will give a few hints concerning the mode of doing so.

Much of the future effects depend upon the preparation of the soil and the mode of planting, to grow masses of flowers to perfection. The earth should be as deep and rich as for a crop of potatoes, cauliflowers, or onions. This enrichment may be called the foundation of summer beauty. The latter rests upon the former as the bridge upon the key-stone, and this foundation should have been laid last autumn or winter. But better late than never ; and if there is a piece of empty border or a flower bed that you intend to be the grandest portion of your garden, give it 4 or 6 inches of rotten dung, and dig it up deeply at once, breaking the clods as fine as possible. Leave the surface to mellow into greater fineness, while we determine the arrangement and the time of planting. As to the latter, leave it till the last week in May.

Before the final planting out, see that all plants in pots, annuals, &c., are thoroughly soaked with water. As they are planted, press the earth firmly against them with the hand. This helps the roots to bite the soil, and to grow at once.

Every vacant space in mixed borders or shrubberies should now be filled up with beautiful and sweet flowers, not forgetting to sow mignonette in all directions. The scent of this, mixed with the perfume of roses, cloves, and sweet-brier, when all are bathed in dew, may be pronounced, without irreverence, divine.

Harden off gradually, and plant out dahlias, heliotropes, castor-oil plants, and all semi-tender, subtropical annuals or perennials. Sow biennials and perennials, and propagate them by slips or cuttings. Thin the shoots of phloxes, &c., and strike them, and tie the flowering branches to stakes. Thin out annuals

sown in patches, or transplant the same into their places in borders. Hoe, rake, and clean beds and borders. Water anemones, tulips, ranunculus, &c., to prolong the blooming period and enlarge the blossoms. Tie up pinks, carnations, and cloves. Put in runners of Neapolitan and other violets. Divide polyanthus and auriculas. Stake hollyhocks, and feed them with liquid manure. Sow seeds of wallflower, polyanthus, pansies, and nemophilas, for successive crops.

PITS AND FRAMES.

These will now be mostly emptied of their flower garden furniture, and may be devoted to the propagation of auriculas, polyanthus, &c., from off-sets and seeds; or for the growth of such plants as balsams, celosias, cockscombs, fuchsias, globe amaranthus, pelargoniums, petunias, *Salvia splendens*, &c., for the window; or they might be used to grow a few cucumbers and melons. For the latter purpose it would be well to put, say 2 feet of hot tan or half-rotten dung, into the frame or pot, or place about a foot of soil over it, and then plant one or two plants under the centre of each light, and keep up the temperature to about 70 deg. The cucumbers should be stopped at every leaf. By thus keeping the plants at home, much fruit may be cut from a small space. The mode of stopping melons is different. As soon as the plants have formed two rough leaves, pinch off the tops. They will then throw up probably four or more shoots. Allow two or three of these to run towards the back, and a similar number towards the front of the pit or frame; or if two plants are put under one light, train one wholly to the front and the other to the back. When they have reached the sides, stop each of the shoots. Let them break into laterals, as they are called, along the entire length. It is upon these that the fruit are formed. Male blossoms will shew first, and then the female, with the embryo fruit at its base. When four or six of these appear open on the same plant at once, they should be set. This is done by placing a male flower, with ripe pollen on it, against the female blossom. Should all these fruit start swelling together, a crop is certain. But should one get ahead of the other, it will draw all the strength of the plant to itself, and literally starve the others to death; hence the importance of setting a full crop on the same day. Queen Emma and Bromham Hall are among the best melons. Telegraph and Cuthill's Black Spine are as useful cucumbers as any. Much time will be saved by purchasing plants from a nurseryman or market gardener. Stop the cucumbers early in the afternoon with a little water. When the plants are well stopped, and the fruit are well formed, they may be

GLASS HOUSES.

Such plants as azaleas, in full blossom, should be shaded to prolong their blooming. Stake pelargoniums, fuchsias, &c., and give them more room.

Many spring flowers, such as hyacinths, tulips, Chinese primroses, &c., will now be fading, and should be removed to sheltered places out-of-doors, or thrown away as soon as they are done flowering. Double Chinese primroses should be kept close for a time when they have finished flowering; and as soon as they have freely started into growth, broken up and divided, potting each piece separately in a light mixture of peat loam and silver sand, thoroughly drained, and placed in a close pit or frame till rooted. Cinerarias, calceolarias, and single primroses should be sown for next year.

Camellias that are out of blossom should now be shifted into larger pots, if necessary, and placed in a shady part of the house till their growth is finished, and the tiny blossom buds for next season's flowers are formed on the extremity of the shoots. Coronillas, epacris, and cytisus will now be in full beauty, and should have all the light and air possible. Water copiously, and instantly fumigate with tobacco smoke if fly appears, and keep the house cool by opening doors and sashes.

All glass-houses in villa gardens should have one or more creepers or strong growing plants on the roof, such as *Passiflora cærulea*, *Dolichos lignosus*; some of the clematises, Tacsonias, such as *Van Volkemii*, *Mandevilla suaveolens*, *Cobea scandens variegata*; or even jasmines, tall fuchsias, myrtles, *Plumbago capensis*, and heliotropes. These should now be encouraged to grow freely; and if a few hanging baskets of *Lobelia speciosa* and *Paxtonii*, fuchsias, thunbergias, petunias, ivy-leaved pelargoniums, achimenes, and ferns, are suspended from the roof, the whole will have a pleasing effect, without much trouble.

A good deal may be done to furnish such a house with even commoner things than these, such as *Maurandias*, canary creepers, *tropæolums*, *Convolvulus major*, *ipomeas*, *verbenas*, petunias, sedums, *saxifrages*, *echeverias*; and such annuals, as *nemophilas* of sorts, scarlet runners, &c. Anything green would be infinitely better than that utterly neglected and desert look that the solitary glass-house in villa gardens often exhibits during the summer months. It is often entirely neglected, or converted into a place for drying bulbs harvesting seeds, or storing dirty pots; while every other department is blushing into blossom, and being clothed with new robes of spotless beauty. The glass-house should either be wholly emptied during summer, and scrubbed clean, or be filled with plants, of at least equal beauty, and, if possible, beauty of a different character, or form, to that found in the open air.

THE COUNTRY GENTLEMAN'S MAGAZINE

JUNE 1870

LORD LEIGH, THE GAME LAWS, AND TENANT-RIGHT.

WERE all landlords to act towards their tenantry in the same manner as Lord Leigh, we dare almost undertake to say that most tenants would reciprocate the kindly feeling as much as do those who farm the Stoneleigh estate. Kindness and generosity, unostentatiously bestowed, provoke like feelings in the recipients; unless, indeed, the hearts of the latter have become utterly callous and depraved. Lord Leigh, as we have already announced, has frankly given up to his tenants, not his legal right, as some of our contemporaries appear to suppose (all game by law in England belongs to the tenant), but that right which private contract, binding in law, conferred upon him, viz., the killing of hares and rabbits. Seeing that there were strong feelings in the breasts of agriculturists against hares and rabbits, and also that in many cases there were too good grounds for animosity towards the vermin on account of their destructiveness, Lord Leigh wisely and gracefully—for it was without compulsion—handed over the privilege of killing the pests and pot-fillers to the farmers themselves. His lordship did not desire to see the *animus* against hares and rabbits transferred from them to their preservers. He appreciates a thriving and contented tenantry to a whole hecatomb of leverets and conies, creatures which eat and wantonly waste the crops of the cultivators of the soil. This is a simpler and more effectual way to check the heart-

burnings and the strife which prevail between proprietor and tenant about game than can be hoped for by any Act of Parliament. For in all Acts, however carefully drawn up, there is somewhere a gap wide enough for the passage through of that proverbial coach-and-four. The interests of landlord and occupier are so mutual, so bound up in one another, and linked together, that it is marvellous, when one comes to look at the matter calmly, how any disputes should ever arise. They are far more intimately connected than partners in a mercantile firm, and these do not go on quarrelling one with another after the fashion of proprietor and tenant. For a good reason, the business would not stand it; and when there is a quarrel, as sometimes happens among partners, they separate. But landlords and farmers cannot part; they cannot advertise a split in partnership; they are as indissoluble as the Siamese twins—severance would be death to both. Is it not folly, then, to go on continually bickering and fighting? “A house divided against itself cannot stand;” at least it cannot stand in the stable and beautiful order it would do were harmony instead of discord to pervade the family. Friendly concessions, mutual forbearance, and a desire to deal fairly on both sides would, we believe, soon spring from friendly intercommunion; and even the vexed question of game might be amicably settled without legislative intervention were the relationshi of

the owner and tiller of the land once properly understood. There is no farmer, we believe, who would not wish his landlord to have a fair day's sport when he walked across his fields, and no landlord who thoroughly understands the duties and responsibilities of his position would ask for more.

The kindly way in which Lord Leigh handed over the hares and rabbits to the farmers has called forth from the latter as warm-hearted an expression of thanks. In an address which the tenants have presented to Lord Leigh, they say:—"We take this opportunity of tendering our grateful recognition of your lordship's liberality in granting to us the privilege of killing hares on our respective farms—a privilege the more valued because it has been unsolicited. Ever ready to perform all the duties of a landlord, your lordship has again been foremost in discouraging the preservation of game to the injury of the tenant. The example which your lordship has set will, we earnestly hope, be extensively followed by other landowners, and will remove a frequent source of irritation and discontent." Now, this is the kind of feeling that should animate all proprietors and occupiers throughout the kingdom. Then would agriculture advance with strides which would outstrip those of the last quarter of a century (rapid as in many particulars these have been), as the electric telegraph does the seven-league boots of Jack the Giant Killer.

Besides the Game-laws there has been another subject greatly agitating the agricultural world of late, and in our humble opinion a much more important, though less exciting one, viz., compensation for a tenant's unexhausted improvements. Well, Lord Leigh has also—as he recognized the hardships of over-preservation of ground game—seen the reasonableness of making compensation to a tenant who has laid out a large

amount of capital on a farm which he has to leave before having the opportunity of *recouping* himself. There is great and just cause of complaint about this, as farms have often let at far higher rents on account of improvements effected by the tenant, for which the landlord never paid a farthing. He pockets, without trouble or anxiety, the reward of the occupier's money and skill, and the latter is sent forth to "fresh fields and pastures new," without a penny. Lord Leigh has resolved that on his estate at least this injustice shall no longer be perpetrated, as will be seen from the following circular addressed by his lordship's steward to all the tenantry:—

Estate Office, Stoneleigh Abbey,
Kenilworth, April 27, 1870.

Dear Sir,—I am directed by Lord Leigh to draw your attention to the fact, that should you, from *any cause whatever*, quit the farm you now hold under him, every unexhausted improvement made at your expense on the farm will be paid to you—the value to be ascertained by two persons, one chosen by you and one by his lordship, they appointing an umpire, whose decision (in case they differ) shall be final and conclusive.

Of course you will see that before you commence improvements they must be sanctioned by Lord Leigh (through the agent), to whom applications, stating the nature, cost, situation, &c., of the work (with plans when necessary) must be made. When sanctioned, a written authority will be given by the agent. This must be carefully preserved: it will evidence your claim and prove the date of permission.

So few changes of tenants have taken place on the estates (except from deaths, when relations have succeeded) that hardly a case has arisen (indeed I do not know one) during his lordship's possession of the estates that this dealing with a just claim could be recognized.—Your very obedient servant,

GEORGE JONES.

This nobleman is evidently striving to do his duty. Would that the whole of his order had the same high sense of their responsibilities to those who rent for cultivation the soil they own!

THE POLLUTION OF RIVERS.

[Continued from page 266.]

PURIFICATION OF SEWAGE BY IRRIGATION.

WE have still to discuss what may be called the agricultural remedy for the nuisance created by town sewage. In the first place, irrigation involves filtration. The acre allotted for the drainage water of a hundred people may be a gently sloping square of 70 yards, or thereabouts, and the 2000 gallons daily from these people will then have to trickle 70 yards abreast for 70 yards down the slope in twenty-four hours. The quantity delivered every hour thus need not be more than half a gallon for every lineal foot across the slope, and this half gallon need not travel faster than at the rate of 8 feet per hour, in order to traverse the surface of the land within the day. No doubt, in the actual work of irrigation, frequent intervals of rest are needed by the land, and it may not be oftener than one day in three or four that the growing crop will bear this liquid dressing; moreover, it is impossible in practice to regulate the distribution of water over land with any such uniformity as, for the purpose of illustration, we have supposed; but even if the watering were many times as great in quantity at a time as we have assumed, and the motion many times as rapid, it seems plain that the network of leaf and root through which sewage in irrigation passes (supposing it to sink beneath the surface as well as trickle over it) must retain all the coarser suspended matters. And no ordinary filter in a tank, considered as a mere sieve or strainer, can be equal to it in the quantity of active surface brought to bear within a given time on a given quantity of the material to be cleansed.

But a filter, as has been already shewn, is not a mere mechanical contrivance. It is a machine for oxidizing, and thus altogether transforming, as well as for merely separating the filth of dirty water. And in this respect especially, irrigation necessarily includes filtra-

tion. Sewage traversing the soil undergoes a process to some extent analogous to that experienced by blood passing through the lungs in the act of breathing. A field of porous soil irrigated intermittently virtually performs an act of respiration, copying on an enormous scale the lung action of a breathing animal; for it is alternately receiving and expiring air, and thus dealing as an oxidizing agent with the filthy fluid which is trickling through it. And a whole acre of soil, 3 or 4 feet deep, presenting within it such an enormous lung surface, must be far superior as an oxidizer for dealing with the drainage of a hundred people to any filter that could be practically worked for this purpose.

To this item in the character of both irrigation and filtration, as chemical processes, there must be added another cleansing agency, also of a chemical kind, in which the former has very greatly the advantage. We refer to the actual appetite for certain dissolved impurities in filthy water, which soil, whether in a tank or covering a field, owes both to general surface attraction, and to the chemical affinities which some of its ingredients possess. This appetite is doubtless very limited in its amount, but it is directly proportional to the quantity of material exercising it. The superior capability of this kind which the soil of a field possesses, in comparison with that in a limited filtration tank, depends partly on the immensely greater quantity of cleansing material which an acre drained perhaps 4 feet deep, necessarily brings to bear upon the filthy fluid; but also and especially on the fact, that in the former case this appetite is, except in winter time, always kept alive and fresh by the action of plant growth in constantly removing the deposited impurities, and rebuilding them into wholesome organic structures.

Considered, then, merely as a mec

and chemical agency for cleansing the drainage water of our towns, it seems plain that a sufficient extent and depth of porous soil to be used in irrigation, having periodical intervals of rest during which the soil drains and becomes refilled with air, certainly must be the best possible strainer, oxidizer, and filter of water which, like the sewer water of our towns, contains nauseous organic impurities, both suspended and dissolved. That it is so, analyses of effluent waters have satisfactorily proved, as will be illustrated at length hereafter. Meanwhile, we have further to consider the last great advantage of the soil over all other filters, in that it *utilizes* a considerable proportion of the substances which they only separate, or at best transform.

This is the second point in our discussion of the agricultural remedy for river pollution, so far as that is due to the influx of town sewage. Sewage filth is "fertilizing matter," and therefore valuable as a manure. Every one is familiar with the idea that the fertility of a farm depends very much on the quantity of the live stock kept upon it. It is, in fact, an established maxim in agriculture that, apart from the use of imported and manufactured fertilizers, the maintenance of fertility depends very much upon the live stock which the farmer keeps upon the land, and the quantity of manure which he can thus apply to it.

The fertility of the 23,370,502 acres in the hands of English farmers is thus dependent on the 19,821,863 sheep, 3,706,641 cattle, 1,629,550 pigs, which, according to the statistical returns just issued by the Board of Trade, are kept on English farms; a number which, calculated wholly as sheep—that is, putting cattle of all ages as equal to six, pigs as equal to two, and horses equal to eight, sheep a-piece—amounts in food-consuming, and therefore manure-producing, power to as nearly as possible two sheep per acre over the whole area of the enclosed land in England. Taking 1,141,996 agricultural horses into account, we may say that the whole farm stock of this country is less than five sheep

to every 2 acres in the hands of English farmers.

"MAN" AS FARM STOCK.

We have, however, omitted all reference to another resident animal of the greatest food-consuming power, for whose maintenance, indeed, all these acres and all this live stock are owned and cultivated. Nearly one-third of the live-stock of this country is mankind! In 1869, there were in England 20,658,599 of "man;" and he consumes not only the produce of all these acres, and of all these cattle, sheep, and pigs which are maintained upon them, but imported food as well, to the extent of two-fifths of the estimated quantity of our home-grown wheat, and probably one-twentieth or more in excess of our home-grown meat. A creature of such great powers of consumption ought, according to all the analogies, to be of corresponding agricultural value as a fertilizer. If, leaving out of consideration the products of respiration, excrement be just the food of an animal, *minus* its growth, then, on the ground of both these elements of the calculation, man ought to be the very best farm stock we have. He is not only a much better fed animal than a sheep, but he takes much less out of his food. Bread and beef are better food than grass and turnips; and the growth taken out of these several rations is much less in the former case than in the latter. The population fed on bread and beef does not increase in number, and that is virtually in total weight, more than 2 per cent. per annum, whereas the "population" fed on grass and turnips increases in weight at least 30 to 50 per cent. within the year. A sheep builds its whole weight of body out of the food of eighteen months. The average age of man in England is rather more than forty years, and the weight of his body at death is all that he has saved out of all the food he has consumed during the whole period of his life. On every ground, therefore, we ought to anticipate the superiority of man to sheep as a manure-producing animal for farm use.

And it is worth while to compare the two

further. So far as England is concerned, although the sheep population varies considerably from year to year, they are as a whole as nearly as possible alike in number; and in the month of June, when the agricultural returns are made up, and when they are not above half-grown, they are also very nearly alike in weight. The carcass weight of the sheep sold at auction is barely 80 lb., which would correspond to a live weight of 140 lb.; and may be considered also as the average weight of the adult man. Comparing, then, the respective rations, their relative waste of food, their weight and number, we may reasonably expect that English men and sheep, at the very least, to be as efficient as one sheep in the maintenance of English man. But what is the fact? The sheep is the very best live-stock known to English agriculture, and man is virtually good for nothing. What would the English farmer do with his flock? Over all the oolitic, chalk, and gravel soils—the light land districts of the country—to be deprived of the assistance of sheep would be the ruin of the agriculture. Man, on the other hand, is, as live-stock, we repeat it, virtually useless to him. The excrement of a sheep is worth, at least, something to the farmer. In South Lancashire the excrement of man does not realize anything at all annually individually.

The annual value individually of man as live-stock in Lancashire may be put down at less than 4½d.; and this supposes the ash and liquid waste with which the excrement is mixed to have no share in the valuation. Indeed, in place of taking all England into account, if we confine ourselves to the Mersey basin, the agricultural worthlessness of the immense stock of man here “folded up” becomes a perfect scandal. The population of the district whose drainage runs past Liverpool is 1,103,520 acres, of which, according to the proportion between the total area occupied by Cheshire and Lancashire given in the agricultural returns, we may suppose that 685,000 acres are in the hands of farmers. The whole farm stock

(excluding horses) of this district counts, upon the data already quoted, as 1,750,000 sheep, equal to rather more than two and a-half sheep per acre—considerably above the average farm stock of England. The population, on the other hand, was in 1861, 2,307,788, and in 1868, according to the experience of its growth during the last thirty years, it must have been 2,650,000, one-half more than the actual farm stock of the district.

Three hundred and forty thousand tons of dirty ashes are carried out from a population of one and a-quarter million, living in the nine towns mentioned in our table. If all the houses in the river basin are equally productive with those of Liverpool and Manchester, there must be nearly 600,000 tons produced within the area, equal to a dressing of manure over probably about 20,000 acres, less than one-thirtieth of the acreage occupied by the farmers of the district. No doubt the general fertility is to some extent benefited by this contribution from the towns, though, as it is used chiefly in potato cultivation, its produce is sold off the farms, and adds but little, therefore, to their permanent fertility; but the result, even on the most liberal estimate, is ridiculously small when contrasted with what all the agricultural analogies would lead us to expect. The existing plan of scavenging is, in fact, an utter failure agriculturally. That which is the especial opprobrium of the water-closet system is almost equally true of the privy and the ash-pit. Not one-seventh of the excrement of man is carried to the field; the liquid part drains directly to the sewer, or sops the land on which the houses stand; and even the solid part, mixed with the ash waste with which it is carried to the manure depot, first receives a washing which soaks most of its valuable part away. And all this is permitted, and indeed defended, in a district containing thousands of acres of waste moss land and peat bog on its lower levels, large tracts of second-rate pasture land below the level of many of its towns, and abundance of poor land higher up, all of which would well repay the application of manure.

IMPORTS AND EXPORTS OF AGRICULTURAL COMMODITIES.

JANUARY TO APRIL 1870.

THE official returns of the two months of this year, ending February—the latest one that has been issued—shew that 3314 cattle less have reached our shores than in the corresponding months of 1869; 16,681 as against 19,995. Whether this is on account of the bad weather, which might have prevented cattle from abroad appearing in our markets, or the low prices that have been going for secondary qualities, we know not; but the facts of the matter, so far as Parliamentary authority is to be relied on, are as we have stated above. There was also a falling off of nearly 100 in calves, 1717, to compare with 1815. Sheep, however, were brought to our shores in much larger quantities than in the first two months of 1869, the numbers being for this year 60,510, and the like period of last, 37,952. One solitary lamb was landed in this year, and it can be fancied that it was greatly out of its element. There was a large increase in the importation of swine and hogs, the price of pork being brisk throughout the season, but there is now rather a decline in prices.

Although the value of corn in the market has been low, foreign countries have been sending us more than they did in January and February 1869—the total quantity of wheat received is in excess nearly 400,000 cwt., the exact quantities being for the time of this year that the accounts are made up 7,518,324 cwt., to compare with 4,805,637 cwt. More than the whole of the increase, indeed nearly treble, came from Russia and the United States, the decrease being chiefly from Prussia, the Hanse Towns, Turkey, and the provinces bordering upon the Danube. Nearly half the barley was imported the two months of this year that we re-

ceived last; about a-third more oats; nearly a-fifth less peas; more than a-half fewer beans; and a ninth less Indian corn, as the following figures will shew:—

	1869. cwt.	1870. cwt.
Wheat.		
Russia.....	2,088,560	2,564,962
Denmark.....	58,507	45,174
Prussia.....	479,293	217,185
Schleswig-Holstein, Lauenb'g	2,102	—
Mecklenburg.....	42,404	69,517
Hanse Town.....	201,846	46,345
France.....	69,183	8,431
Illyria, Croatia, Dalmatia.....	126,824	14,629
Turkey, Wallachia, Moldavia	224,041	101,970
Egypt.....	140,064	84,773
United States.....	1,218,517	1,897,645
Chili.....	48,098	—
British North America ...	32,841	66,173
Other Countries.....	73,402	66,443
Total.....	4,805,637	5,183,247
Barley.....	2,672,499	1,286,626
Oats.....	778,382	1,014,488
Peas.....	175,238	143,595
Beans.....	474,007	227,219
Indian Corn, or Maize.....	2,818,273	2,556,551
Wheatmeal and Flour.....	125,282	154,327
Total.....	780,935	767,940

There was a decrease in the imports of butter—119,943 cwts. as against 153,272; in cheese, an increase of upwards of 9000 cwts. Our henwives apparently have been more industrious, the hens better layers, or fewer eggs eaten, as we notice a decrease of 6,000,000 in the imports; or, in other words, a sixth part of the population of the British Isles (providing we have not had a more productive home supply) have, in the course of the first two months, gone with an egg less to their breakfasts than they did in the same period last year. The exact numbers

imported were 38,926,080, as against 45,060,600. Generally speaking, there was considerable increase on the receipts of beef and pork, and bacon and hams.

Cotton seed was in less demand, only 8962 tons being imported, in comparison with 21,535; so also oil seed cakes; there was more clover seed by about 3000 cwt. ; about a half less flax seed and linseed, 85,571 qrs., as against 170,232; and a slight increase in rape, 27,416 qrs., to compare with 25,156. There was little change in the quantity of tallow imported, and in wool a decrease of more than 5,000,000 lb., the respective quantities being for the two months, this year 238,423,000 lb.; last, 28,955,427 lb. The imports of flax increased from 116,384 cwt. to 190,404. Hemp shewed a slight increase; hops a decrease of more than one-half; and there was likewise a diminution in hides.

Fertilizing substances were in greater demand, the imports of bones being 8249 tons to compare with 6722; brimstone, 114,440 as against 89,573 cwt.; and of guano—with the exception of about 2000 tons from other countries not specified, all Peruvian—20,608 tons, while in the same time last year only 4018.

These are what we brought in from over the seas, and we transhipped an almost inappreciable quantity of bacon, cheese, and wheat; of guano, 925 tons as against 555 in the similar period in 1869; of hemp, about the same quantity as in 1869; 900 cwt. more hides; and 2,145,17 lbs. less wool.

The exports of British and Irish produce were for two months as follows (we give the declared value instead of the quantities, which cannot be given in the case of imports, as it takes a month longer to make up their worth):—Two months of—

	1869.	1870.
Bacon and hams.....	£12,701	£15,304
Beef and pork.....	1,630	2,563
Butter.....	45,136	40,968
Cheese.....	13,730	16,883
Horses.....	25,685	7,107
Wool.....	96,690	53,776
	£195,572	£136,601

There are two remarks which might be made regarding these figures—the first about wool, in which there is a great decline. Of course this is partly to be accounted for by the diminution in the imports, but is also somewhat due to the increased sum for the exports of our woollen and worsted manufactures, the difference in the value the first two months of this year being £141,575. This is rather a healthy sign of the country than otherwise; but what does the decline in the export of horses mean? Is it that, having already parted with most of our best animals, the foreigner can now afford to do without further importation; or are our equine breeders beginning to see that it will not pay at any price to part with all the geese that lay the golden eggs? We hope it is the latter question that will be answered in the affirmative.

In the returns for March and April, we find that there is a great decrease in the importation of all animals, with the exception of calves and pigs, the latter of which have more than doubled in the first quarter of this year as compared with the corresponding period in last. The number of oxen, bulls, and cows reaching our shores, up to the end of March 1869, was 35,326; this year, up to the like date, only 24,056. In calves, there was a little alteration, 3031 in the first three months of 1869, as against 3045 in the like time this year. Sheep declined from 131,661 to 115,512; and lambs, from 1327 to 5. Swine and hogs, on the other hand, rose from 7726 to 18,710, or upwards of 140 per cent.

There was an increase of nearly 450,000 cwt. in the quantity of wheat. The great increase came from Russia and America; indeed, had there not been a diminished supply from other countries, the excess over the receipts of last year would have been enormous, Russia sending more by 931,475 cwt., and the United States an addition of 1,050,383, or an aggregate from the two of 1,981,858 cwt. The following table shews exactly whence our foreign wheat supplies were despatched:—

Wheat.	1869. cwt.	1870. cwt.
Russia.....	2,565,526	3,497,001
Denmark	115,730	52,261
Prussia	915,376	237,053
Schleswig, Holstein, Lauenburg	19,519	—
Mecklenburg	80,639	94,447
Hanse Towns	272,655	67,447
France	94,300	10,481
Illyria, Croatia, Dalmatia	212,380	33,384
Turkey, Wallachia, Moldavia...	359,086	171,651
Egypt	200,135	88,527
United States	1,971,265	3,021,648
Chili	82,664	21,600
British North America.....	32,841	87,233
Other Countries.....	113,599	91,881

Total 7,036,015 7,474,615

The imports of barley were about one-half less, oats a little more, peas less, beans also so in a very considerable degree, and Indian corn or maize a slight increase. Wheatmeal and flour shewed also an augmentation, as will be seen from the following statistics:—

	1869. cwt.	1870. cwt.
Barley.....	3,658,597	1,853,260
Oats.....	1,274,281	1,313,419
Peas.....	207,507	181,687
Beans.....	677,380	389,379
Indian Corn, or Maize	3,882,788	3,920,048
Wheatmeal and Flour	1,144,282	1,195,204

The decrease in the imports of butter amounted to upwards of 45,000 cwt.; 217,039 as against 262,935 cwt. in the corresponding quarter of last year; while in cheese there was an excess of 12,000 cwt., 93,030 to be compared against 81,161 cwt. In the first three months of this year there was a diminution in the import of eggs, in round numbers of no fewer than twelve millions, the precise figures being, for 1869, 96,915,720; and for the first quarter of the current year, 84,924,480. Is it not possible, with careful attention to the treatment of our farm-door fowls, to bring down, in a profitable way, our imports in this particular article still further? In bacon, and salted beef and pork, there was also a marked diminution, but an increase in the outside supplies of fresh beef and pork.

Turning now to the artificial feeding-stuffs, which produce our home beef and mutton, the exactly what we should have ex-

pected (seeing that, on account of the scarcity of keep all through the spring, much more artificial substances than usual have been used for keeping our cattle in condition), viz., that the imports, with the exception of rape, has decreased materially. Oil seed cakes have fallen in the quarter from 39,660 to 25,347 tons, about 35 per cent., and cotton-seed shews a decrease of 5600, the quantities being for 1869, 33,701 tons, and this year 28,113 tons. Rape rose from 38,591 qrs. to 49,920 qrs. in the same period. There was less clover received by 17,000 qrs., the respective quantities being for the first three months of last year 97,069 as against 80,133 cwt. Flaxseed and linseed declined from 274,332 to 154,732 qrs. Tallow shewed an increase of 30,000 cwts., flax about 40,000 cwts., and hemp a decrease of 18,000 cwts.

Fertilizers continue to reach us in larger quantities, 350 per cent. more guano being landed in the first quarter of this year than in the corresponding one of last. The exact quantities were, for the three months of 1869, 12,004 tons; for the same time this year, 43,951. Bones rose in the quarter from 10,893 tons to 14,493 tons.

On the first two months of the year there was a decrease in the imports of wool; but in the month of March, the supplies were so much in excess of the corresponding month of 1869, that the deficiency of the first two was made up by more than 11,500,000 lb. the quantity received in the first quarter of 1869, from the various countries whence we import being 51,575,634 lb., whereas in the same period this year it reached 63,201,919 lb. There was a deficiency of nearly one-half of the quantity received from Europe; South Africa shewed an increase of about 500,000 lb.; British India, a decrease approaching 700,000 lb.; and "other countries," as they are designated in the schedule, a diminution of more than 800,000 lbs. But Australia made up not only for all the deficiencies of the other quarters from which we derive the staple of our clothes, but also the whole of the augmentation in the grand total as compared with the corresponding period of last year, her surplus being 15,233,077 lb.

Of the articles enumerated above as having been received by us, there were transhipped 4 cwts. of butter; 3804 cwts. of cheese; 267 tons of guano as against 903 tons; allow, 3356 cwts.; and of sheep and lambs wool, 2,984,079 lb. as against 2,374,924 lb. in the corresponding quarter of 1869.

We now turn to our export account, so far as it relates to agricultural matters. Here, besides the quantities, we can also give the values for the three months, which cannot be done with regard to the imports, as it takes a month longer to make them up. And instead of giving the quantities here, we think it will be better to give the pecuniary value, as this fluctuates so much at times that the mere statement of quantities often afford no idea of their money's worth. Well, then, we find an increase of more than £4000 in the exports of bacon and hams, £24,947 as

against £20,688; also an improvement in beef and pork, £4132 to compare with £2313; a decrease of upwards of £11,000 in butter, £56,836 to set opposite £65,971; an increase of more than £5000 in cheese, £26,629 to compare with £21,340; a continued diminution in horses, their worth being only £17,437 as against £40,911; and of wool a decrease of nearly £60,000, the figures being respectively £100,444, and £159,384. These statistics relate of course to the first quarters of 1870 and 1869. Adding these items together we find, for the first three months of 1870, the total to be £201,346; and for 1869, £267,606—a decrease of £66,260. On all our export transactions of every kind there was an increase of £2,750,000 on the quarter, the totals being, for 1869, £42,803,605; and for 1870, £45,678,774.

SEWAGE FARMS.

3. ALDERSHOT FARM.

THE case of Aldershot may be placed first upon the list, because here land has been taken for irrigation, not by the authorities, but by a tenant who, bound no doubt to cleanse the sewage of the camp, yet has for his principal object the extraction of a profit from its use, so that he comes more nearly under the same class with the example last named. Mr Blackburn here receives the drainage of the north and south camps, *i.e.*, of a population which is fairly represented by a constant number of 7000 adults. During winter, the drainage of this population, amounting to about 700 tons a-day throughout the year, is poured in succession over the several fields of the farm, 80 acres in all, one-half being in one and two years' old Italian rye-grass, and the other half growing crops of potatoes, mangold - wurtzel, cabbages, &c. During the summer, the crops upon the arable half take but little of the drainage of the camp, and it is then poured almost exclusively over the Italian rye-grass land. The soil is the poor sand of the Aldershot waste (consisting of almost pure silica), prepared at considerable expense by levelling and deep grubbing, so as both to provide a uniform slope over which the water may flow evenly, and to remove the ferruginous "pan" which everywhere underlies the soil, and would hinder the even distribution of fertilizing matter downwards. A few deep drains serve to draw off the water which sinks beneath the surface.

The first of the samples taken from the sewage was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The second sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The third sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The fourth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The fifth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The sixth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The seventh sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The eighth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The ninth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature. The tenth sample was taken from a drain, 250 yards from the camp, and was found to be of a very offensive nature.

effluent water was apparently clear. The difference of composition indicated by analysis shews that while the water poured on, had, in its first passage on the surface already richly manured, appeared solved and carried with it some of the matter left by a previous dressing, so that a few yards of passage the sample (2) exhibited in its composition an even larger quantity of filthy matter in solution; yet in the sample (3) after passing through the land, the nitrogen and ammonia as shewn in the analysis had to a large extent disappeared.

The set of samples marked A. were taken on 1st May 1868. No. 1 was the sewage as it passed upon the land. No. 2 was effluent water from the first series. They indicate an immense reduction in quantity of all the dissolved polluting matter in sewage by the process of irrigation. The organic carbon was reduced from 1.5 to 0.1, and the organic nitrogen from 2.5 to 0.1, or 100,000 parts. The above figures shew, however, that the whole of this amelioration cannot be attributed to the purifying action of the soil and crop, for the solid nitrogen was reduced in both series, and the chloride of ammonia in the former. The nature of the effluent water with about one-third its volume of unpolluted spring water. All that can be safely inferred from the above analytical results is, that in series A., the organic impurities, soluble and insoluble, were reduced to less than one-eighth of the original sewage in the latter case being stronger than in the former. Even when the effluent has been made from the first series, the result is a very satisfactory improvement. In this case the extreme natural fertility of the soil does not seem to have been a hindrance to the efficiency of the process of cleansing by irrigation. The farm managed, is covered with a capital crop of vigorous growth, to be fed by the fil-

which accordingly is greatly purified by the process. Mr Blackburn lets portions of his land to neighbouring cowkeepers at £20 an acre; and here the grass, cut in regular rotation, was in the heat of July, when everything was withered and burned up around it, a perfect oasis of luxuriant green, yielding annually its four or five crops of 8 to 10 tons a-piece per acre. The Aldershot farm appears the more satisfactory as an example of the sewage nuisance abated, at the same time that its filthy contents are converted into valuable produce, from the circumstance that a previous attempt to deal with it by subsidence and filtration tanks had been a complete failure.

Supposing 40 acres here to yield £20 an acre, and other 40 acres to owe one-half of their crops, or £10 an acre, to the winter sewage, we have here a return of £1200 from the waste of 7000 adults, or 3s. 4d. per head per annum.

4. CARLISLE.

The sewage of Carlisle finds its way, for the most part, into the Eden through the main sewer beneath the alluvial pasture land bordering the river. It is delivered in the middle of the river channel through a submerged iron pipe. On the town side of the meadow, a pumping station has been erected by Mr M'Dougal, to whom the land (about 100 acres) is let; and a quantity is thus lifted, deodorized by treatment with carbolic acid, and distributed over the land by means of light portable iron troughs. These are shifted from place to place by the man in charge, and in this way the sewage pours on at one place after another, distributing itself with more or less regularity according to the natural surface of the land which has not been levelled—flowing here, ponding there, soaking everywhere. There is an obvious increase in this way to the natural fertility of the land; and a larger quantity of stock is kept upon it than it would naturally maintain. There is no surface drainage from the land to the river, and our sample for analysis was taken by digging a hole 3 feet deep close to where the sewage had been

lying on the previous day, and taking the water to which we at length came.

As there is, properly speaking, no effluent water from this meadow, the whole of the sewage applied being absorbed by the sandy soil, and there being no drain outlet, the result is not quite so trustworthy as in other cases; nevertheless, we may fairly conclude from it that the soakage from the irrigated land into the neighbouring river is effectually purified.

5. PENRITH.

Here the drainage of a town of 8000 people, only partly provided with water-closets, is received on 80 acres of good meadow land near the Eamont. A little more has been done here than at Carlisle to distribute the water by means of permanent carriers; but the treatment is otherwise the same, and the result is very similar. A very large stock of cattle and sheep is kept upon the land to graze down the abundant growth of grass which is obtained.

Here, as at Carlisle, the whole of the sewage is absorbed into a porous sandy soil; but the drain passing beneath the irrigated land pours out a considerable and clear stream into the Eamont, and from this the sample of effluent water was taken. The comparatively small proportions of solid matters in solution, and especially of chlorine in the effluent water, point to the admixture of unpolluted subsoil water that no less than three volumes of this pure subsoil water mingle with one volume of the real effluent sewage. But even after making this deduction from the purifying effect of the irrigation the result is still satisfactory. The whole of the suspended impurity was removed, whilst a reduction of the organic matter in solution was effected to the extent of 75 per cent. of organic carbon and 77.2 per cent. of organic nitrogen.

6. RUGBY.

At Rugby, a town of more than 8000 inhabitants, the Board of Health have taken a lease of 65 acres of land for a term of thirty-one years, at a rental which, with rates and taxes, amounts to £4, 10s. per acre; and, confident in the powers of their somev

gravelly soil (lying upon a clay subsoil) to cleanse their town drainage, and to convert it into valuable produce, they have laid out nearly £5000 on the works required for the distribution of the sewage water over it. An intercepting sewer takes the drainage of all the upper part of the town by natural gravitation to the top of the farm; and, by a deep and costly tunnel drain, the waste of all the lower part of the town is made to flow (along with the tail water of the upper fields) over about 16 acres of the lower part of the farm.

The quantity of sewage at command is about 900 tons a-day, or nearly 4000 tons per annum for every acre of the farm. The land has been in hand for only one year, and much of it was sown with Italian rye-grass for the first time in the spring of 1869, so that the best results can hardly yet have been realized. The third and fourth cuttings (both heavy crops) were, however, ready in the following month of July, and a sale was being obtained for the grass at 8s. a ton upon the land. A considerable portion has been let at £10 an acre; and the 16 acres at the lower end of the farm had supported throughout the spring and summer 54 head of cattle, consuming at least 4 tons of its grass produce daily; and a considerable extent of the crop on these 16 acres had been made into hay. In illustration of the cleansing power of land and plant at Rugby, three samples taken about mid-day, July 13, have been analyzed; No. 1 was raw sewage taken from the hydrant as it poured over the top of the farm; No. 2 was the same sewage taken at the foot of $1\frac{1}{2}$ acre of land in Italian rye-grass, over which it had passed 150 yards down the slope. Thence it flowed along a surface channel about 300 yards to another acre of Italian rye-grass; and No. 3 was taken at the foot of this grass plot, about 80 yards from the carrier which supplied it.

The result of the analysis in which the nuisance of the sewage is entirely abated, and so much water is utilized, is to make it probable that the sewage works have been here an expensive and profitable proposition.

The following account of the experience of the works at this place has been communicated to

us by Mr T. M. Wratishaw, Clerk of the Local Board of Health:—

"The gross produce of the sewage farm, for the year ending 31st December, has been £544, 16s. 8d. The total expenses, so far as the payments (including wages for the year) have been made, stand at £458, 8s. 5d., and I do not apprehend much addition."

"I am not aware of the actual number of persons contributing to the sewage utilized, but should estimate 7800."

7. BANBURY.

A population of about 11,000 people here drain into tanks, from which, through a 12-inch pipe, the sewage is driven by steam-power a mile or more to the upper end of a farm of 136 acres, a lease of which has been taken for twenty-one years, at a rent of £4, 10s. per acre. The quantity thus applied amounts to about 300,000 gallons a-day, or about 4000 tons per acre per annum over that part of the farm which is under irrigation. The sewage settles to some extent in the tanks from which the pump lifts it, and both mud and scum are here taken from it, and mixed with the street sweepings and other scavenging refuse of the town; and 2000 tons of this compost were sold last year, for which a sum of about £100 was received at the depot, the material being loaded by the purchaser into barges on the canal close by. The liquid part, delivered on the highest part of the farm, having about 17 feet of fall before it reaches the river Cherwell, flows twice or thrice over successive fields before it is finally dismissed, and the extreme filthiness of the river formerly complained of is now satisfactorily abated.

The following samples illustrate the cleansing process which the sewage thus undergoes. The series A. was taken at our visit to Banbury on 17th October 1868; No. 1 being the sewage which had accumulated in the pumping well from 10 A.M. to 2 P.M., and No. 2 the effluent water as it left the meadows at 1 P.M. The series B. was collected on 14th July 1869. No. 1 was taken at 10 A.M., and at noon, being raw sewage taken partly from the upper carrier on the farm and partly from the pump well. No. 2 was the water

after it had passed over 200 yards in length, and 4 acres in extent of a field of Italian rye-grass, at the rate of, probably, 70 tons an hour. No. 3 was taken after this tail water had travelled half-a-mile in an open carrier, and then distributed itself over a flat meadow of permanent grass land. It was passing from the underground drain of the field in question, and represents the sewage as it reached the river. The farm is for the most part a very stiff soil, and the greater part of it is still in old grass land, and neither circumstance is favourable to its efficiency; the former because the soil tends to crack in dry weather, thus giving the sewage direct access to underground drains, and thence to the river before it has been properly acted upon by the soil; and the latter because the surface of the land not being specially and evenly laid out for irrigation, the water tends to collect in shallow ponds or puddles, to the injury of the produce, without being itself materially cleansed. The accounts given of the produce of the land are satisfactory, and it is believed that the farm will soon repay rent, and cost, and loan, so that the nuisance hitherto created by the town will be ultimately abated without any serious permanent charge upon the inhabitants.

The produce of Italian rye-grass and of the meadow land is sold by auction as the successive cuttings are ready for the scythe; and prices varying from £3 to £5 an acre have been obtained per cutting.

The Banbury sewage, owing to a deficient water supply, is sometimes much above the average strength, and consequently its efficient cleansing is then a more difficult operation; nevertheless, the above results are by no means unsatisfactory; and they are improving, both as regards the cleanness of the effluent water and the returns from the use of it.

The following account of receipts and expenses, in respect of the sewage farm here, for the year ending Lady Day 1869, has been supplied to us by Mr T. Pain, the Town-Clerk.

<i>Receipts.</i>		
Amount realized from sale of rye-grass	£561	16 6
" " mowing grass	347	18 2
" " oats	198	0 0
" " aftermath	166	11 8
Right of shooting over farm, and sundries	6	1 6
	£1280	7 10

Payments.

Mr Tomline, a year's rent,	£	s.	d.
less property-tax	605	3	1
Rates and taxes for the year	57	4	7
Coals for engine	111	16	0
Labour expended in cultivation of farm	216	2	0
Seeds, implements, &c.	82	0	6
Manager's salary	45	0	0
Auctioneer's expenses of sale, including commission	73	6	11
		1190	13 1
Profit on farm		£89	14 9

Instalment of principal and interest in respect of loan of £4000 borrowed to carry out the irrigation work . £250 0 0

The produce of the summer of 1869, when we were over the farm, bid fair to at least maintain the satisfactory character of the above account.

8. WARWICK.

This town has 11,000 inhabitants, occupying 2400 houses, of which upwards of 2000 are connected with the sewers, has lately poured its sewage over a clay-land farm of 100 acres about a mile away. The quantity thus pumped, and which formerly fouled the Avon, amounts to about 600,000 gallons a-day, double the water supply of the town, or nearly 1,000,000 tons a-year, corresponding to 10,000 tons per acre annually. A large quantity of very dilute drainage water thus flows over a very stiff and therefore less appropriate soil. What the result is, as regards its cleansing powers, appears from the following analysis:—No. 1 is a sample of raw sewage taken from the receiving tank by the pump at 4 P.M. on 14th July 1869. No. 2 is the sewage after flowing over seven acres of recently cut Italian rye-grass taken at the foot of a field of red clay soil, down which it had flowed probably 200 yards, at the rate of 80 or 100 tons an hour. No. 3 is the same water after a second cleansing over 3 acres of Italian rye-grass, in a field of similar soil. The results here may be taken to represent the powers of plant growth and of mere surface action of clay soil, for none of the water apparently had sunk into the land or been absorbed. Here the filth in about 150 tr

of diluted sewage had been satisfactorily reduced by probably two hours' irrigation treatment, under what must be pronounced unfavourable circumstances. Moreover, the sewage, and consequently the residual impurities, had obviously undergone concentration by evaporation, as is seen from the continuous increase of chlorine in the successive samples.

The farm has been in hand for two years. Pumping commenced only in the autumn of 1868, and it was not continuously carried on until the following year. This, together with the difficulty which the low and flat part of the farm presents to the proper drainage from it of so large a quantity of water, has hitherto delayed the satisfactory financial result which is looked for. Nevertheless, the nuisance is sufficiently abated, and large crops of Italian rye-grass have been obtained, for which a ready sale at 10s. and 12s. a ton upon the ground has latterly been realized. The farm must, we understand, pay at least £1600 a-year to replace the costs which the town has already incurred and still bears in respect of rent, pumping, and works.

9. WORTHING.

This town, containing about 8000 inhabitants, has hitherto fouled a stream running into the sea 2 miles to the eastward of it. The town drainage now runs to a tank from which it may flow as heretofore, and still does run during the night, so that a good deal of very offensive filth even now lodges in the bed of the stream. During the day it is pumped and flows upon the land of the Worthing Land Improvement Company, who have about 100 acres on which to receive it. The soil is a good free loam, perfectly well adapted for their purpose, and the natural slopes are quite sufficient for the easy distribution of the water. There are on the lower part of the farm upwards of 40 acres of an alluvial flat of natural grass on which the effluent drainage of the higher arable land is received before it leaves the farm. Mr W. Hugh Dennett, solicitor to the Worthing Land Improvement Company, has communicated to us the following account of the gross

receipts and working expenses of the sewage farm for the year 1869 :—

Receipts	-	-	-	-	£1807	4	9
Expenses	-	-	-	-	1045	6	9

Balance - £761 18 0

The engineer reports that the average volume of sewage pumped each day of twenty-four hours to the farm is about 480,000 gallons (of which about 130,000 gallons are spring or surface water). In addition to this, about 80,000 gallons of water per day flow into the Teville stream. The extent over which the sewage flows is about 83 acres. The whole farm consists of about 96 acres, a portion of which is not sewaged; 42 acres are pasture land. I cannot say that the pollution has altogether ceased, because although it is stated that the 80,000 gallons of sewage flowing into the stream per day is top water, yet it flows from the sewage well, and must be necessarily polluted with sewage. However, the actual pumping of the sewage into the stream ceased some months ago, and the communication has been removed. The Local Board of Health have also cleansed the stream, and there is reason to believe that all the sewage pumped goes upon the land, though materially diluted by spring and surface water.

The sewage, which was somewhat weak at the time of our visit, was sufficiently cleansed by passing over the first plot; indeed it was cleaner than another sample from the effluent stream which was probably carrying into the river the purified water from the stronger morning sewage. Close proximity to the sea affects the proportion of common salt in the Worthing sewage. The proportion of chlorine in all the samples is much higher than the strength of the sewage would lead us to anticipate. Some of the streets are watered with sea-water.

10. BEDFORD.

At Bedford, which contains about 15,000 inhabitants, large sums have been recently laid out under the direction of Mr John Lawson, C.E., on both its water supply and its drainage system. The sewers here receive not only the fouled water supply of the town, together with a certain proportion of the rainfall on its houses and yards, but an immense quantity of land-water from the gravel site on which the town is built. Thus, though the water supply does not much exceed 150,000 gallons daily, the quantity of drainage which

the pumping station, about a mile from the town, is as much as 500,000 or 600,000 gallons daily. Each of the two 12-horsepower engines here stationed is, however, capable of lifting 2000 gallons a minute to a height of 20 feet, so that either of them can deliver the ordinary dry water sewage of the town.

At night, the comparatively pure sewage which then drains away is stored in the sewer and tank at the pumping station. During the daytime it is delivered by an 18-inch pipe to the irrigated land 400 or 500 feet from the tank, flowing thence into a small circular ditch, and afterwards, by two 15-inch pipes, on either side of the nearly flat land which has been laid out in transverse beds for its irrigation. These beds are about 70 feet wide on the side, with a fall of 8 or 10 inches to the central carrier to the midway furrow. The carriers are either 5-inch pipe tiles with a longitudinal slit, or 8-inch half-round tiles, and a fall of about 1 in from 300 to 400 feet is given to them.

The beds were sown in 1868 with Italian ryegrass, and have yielded heavy crops. Up to the middle of July, three crops had been obtained from 20 acres, besides one crop off 15 acres in 1869, and the sales amounted to £330. A much larger area of land is now to be taken in hand for irrigation purchased by the Corporation. The extent at present rented is about 50 acres, but a farm of 100 acres will ultimately be under their management. The cost of pumping, which amounts to £4 per acre of the land now irrigated, will then be reduced to a rent-charge of 10s. an acre, which will be more easily borne.

And as the houses become more closely connected with the sewers, both the extent of the greater area, and the produce obtained from so large a supply of fertilizing sewage, will increase. At present, the sewage is not so thick, but the cleansing process is satisfactory, and its ultimate profitableness appears to result from the character of the crops we are growing on the land. The Italian ryegrass have weighed 12 to 14 tons per acre. Mangold wurtzel and kohlrabi were also very promising. The prices obtained by

the former crop were improving at the successive sales, as the prejudice against sewage grown cattle food was dying out. The difficulties connected with the even distribution of the liquid will also diminish every year, as the settlement of the moved land enables the necessary corrections of the surface to be made, so as to ensure a more uniform flow of water over it. The following report for 1869 has been furnished by Mr John Lawson, C.E. :—

The land leased by the Corporation from the Duke of Bedford contains 54 a. 3 r. 7 p. Of this area 47 acres have been irrigated by sewage.

Two fields, containing about 22 acres, were sown with Italian ryegrass in 1868, and the produce sold from this land in the year 1869 was about £420.

Of the remaining portion of the land irrigated 15 a. 2 r. were sown with Italian ryegrass in the spring of 1869, and the remainder with mangold wurtzel and other root crops. The sales from this portion amount to about £227, 10s. 4d., making a total of £647, 10s. 4d.

Produce in the year 1869, as sold

by auction	-	-	-	£647	10	4
Expenditure	-	-	-	580	4	2
Balance	-	-	-	£67	6	2

II. NORWOOD.

The history of the facts connected with sewage irrigation at Norwood and at Croydon has been sufficiently prolonged to make it now thoroughly trustworthy and instructive. At the former place, about 30 acres of low-lying clay land, with sufficient slope for natural surface drainage, have been well laid out for irrigation by Mr Baldwin Latham, C.E. The drainage of about 4000 people is received into a subsidence tank at the upper end, and thence flows along surface carriers, arranged both nearly in contour and down the slope. The fall in these carriers varies from 1 in 100 to 1 in 1000, and the water stopped at intervals in their course flows over their edges, and so finds its way over the surface of the land. Plots varying in size from 1 to 3 acres are irrigated at once, according to the abundance of the supply, which, especially in summer time, when it is most wanted, is barely sufficient for the proper irrigation of the land. Nevertheless, very good crops of Italian ryegrass

grass are cut five or six times a-year; and a ready sale is obtained for the produce, at prices varying from 9d. to 1s. 3d. per rod, or £6 to £10 per acre, and the Croydon Board of Health have in this way obtained a revenue of £22 per acre during nine months of 1868, and £25 per acre in 1869, which, spread over the population to whose drainage it is due, amounts to about 3s. 9d. per head per annum. Mr Baldwin Latham has furnished the following satisfactory report of the past year's experience:—

The total amount received for the produce in the year was	-	-	-	£741	0	6
The expenditure	-	-	-	592	14	9
Balance	-	-	-	£148	5	9

The relative cleansing which sewage undergoes by employment for irrigation at different seasons of the year, has not yet received any sufficient elucidation. The proximity of Norwood and Croydon to London afforded a favourable opportunity of submitting the effluent water from the two sewage farms to frequent investigation at all seasons of the year. Arrangements were therefore made for the periodical collection of samples for an entire year by our own laboratory man, in order to ascertain how far the efficient cleansing of sewage by this method is affected by the vigour or otherwise of vegetation, and especially whether the process could be relied upon during the winter months when plant life is in a comparatively dormant condition.

The results, extending over an entire year, shew that the effluent sewage was, except in a few instances, so far cleansed, even upon his heavy clay soil, as to be admiscurestan unning water without nuisance. Two of these instances are instructive, since they occurred consecutively during and immediately after seven days frost, viz., in the samples collected on January 25th and January 28th, 1869. The frost was by no means severe, and the organic nitrogen rose from .098 to .419 per 100,000 parts of effluent water, shewing that the removal of offensive nitrogenous organic matter was partially arrested, and indicating that during a severe winter the puri-

fication of sewage upon a non-absorptive clay soil may be seriously interfered with. It is fortunate, however, that the admission of putrescible organic matter into streams during frosty weather is far less objectionable than it is when the temperature is higher, since the organic matter does not render the water offensive so long as a low temperature is maintained.

It is more difficult to account for the emission of exceptionally impure water from the Norwood farm at other periods of the year, viz., on December 3d, 1868, and February 25th, April 8th, May 6th and 20th, August 12th and 26th, and September 24th, 1869, but it probably arose, in some cases at least, from unpurified sewage gaining access to the drains through cracks in the soil.

The hardness of the effluent water was not excessive, although it exceeded considerably that of the water supplied to Norwood. It never contained more than traces of suspended matters.

12. CROYDON.

At the Beddington meadows, below Croydon, 260 acres of an open soil, upon a gravelly subsoil, have for the last seven years received the drainage water of from 30,000 to 40,000 people. The water supply of Croydon, and the copious land drainage of the place, together yield a quantity of sewage equal to at least 3,000,000, sometimes exceeding 5,000,000 gallons daily. This passes through tanks where great pains were formerly taken to remove the solid and floating filth which it carried down, but less attention is now paid to this preliminary process, and the stream flows on very nearly as it leaves the town to the meadows in the occupation of Mr Marriage, who, paying the rent at which the Board of Health have hired or bought the land, pays also a profit rent of £1 per acre per annum for the use of the sewage. The success of sewage irrigation here as a deodorizing and cleansing process is complete. There is never any lack of water, the soil is open, and has just slope enough to render easy the distribution of the liquid over it and through it, and there is sufficient fall between the top and bottom of the farm to allow the tail water of

the upper fields to be spread a second time over fields below before it drains finally away. Very heavy crops of Italian rye-grass have been grown here. As much as 14 to 16 tons per acre are cut early in the month of May; and four or five cuttings a-year are obtained, averaging from 8 to 10 tons each per acre. Mr Marriage has also successfully used dressings of sewage in the cultivation of mangold wurtzel; and when wheat has been grown after sewaged grass, he has irrigated the field with advantage, even so late as the month of July, when the crop has appeared to be flagging, and apparently suffering during a drought. Water-cresses too have proved here an excellent crop for sewaging, not only from the profit derived from them, but from their cleansing powers upon the dirty liquid. The greater part of the land here irrigated is, however, in grass. That being the only crop which can be continuously watered with advantage, it is necessary to retain the greater part of the farm in grass, in order that the enormous quantity of dirty water here passing over the land may be changed from field to field often enough, and cleansed sufficiently before it leaves the land. Latterly, much of the land has been laid down to permanent grasses, which are better adapted for ordinary grazing purposes, and a large herd of feeding cattle have been successfully grazed upon these lands; being moved from field to field as the water drains off them. This was, however, we presume, a temporary arrangement, intended to diminish the tenant's costs as the expiry of his lease approaches, and not intended as an example of the best method of converting the fertilizing matter of sewage into valuable produce. The effluent water, even in the month of December, was satisfactorily cleansed, and contained but mere traces of suspended matters.

The sewage of Croydon is much more efficiently purified than that of Norwood. Only on one occasion (August 12, 1869) during the entire year was the effluent water discharged in a somewhat unsatisfactory condition. On all other occasions, the organic carbon and nitrogen were present in proportions considerably below those necessary to render the effluent

water an offensive addition to a stream at any season of the year. Suspended matters were never present, except in minute quantity. It must be noticed, however, that during the continuance of the seven nights' frost in January 1869, the purification here, as at Norwood, became markedly impaired, the organic nitrogen increasing from .186 part in 100,000, at which it stood before the frost, to .242 part, while the assimilation of ammonia by the vegetation was also retarded, as is seen from the increased quantity of ammonia in the effluent water.

The total solid matters in solution are remarkably uniform at all seasons; but in estimating the degree of purification effected at different seasons on the two farms, it is necessary to bear in mind the relative strength of the sewage employed in each season, since the purity of the effluent water is considerably affected by the proportion of polluting ingredients in the original sewage; in other words, by the strength of that sewage. The strength of sewage is approximately given by the proportion of chlorine which it contains. Estimated by this standard, the sewage of Norwood was strongest in summer, whilst the organic elements in the effluent water were also present in largest proportion during the same season. In winter, when the sewage was weakest, the effluent water was purest. At the Croydon farm, on the other hand, the sewage was strongest in autumn and winter and the effluent water was also less pure in those seasons. In summer, when the sewage was weaker, the effluent water was also purer; whilst in spring, with a still more diluted sewage, the water leaving the farm attained its highest degree of purity. It follows, therefore, that the cleansing of sewage is, in the absence of actual frost, less dependent upon the season than upon the quality of the sewage itself. It is, however, far otherwise as regards the inorganic (and consequently non-polluting) fertilizing constituents—ammonia, nitrates, and nitrites. These compounds are, as might be expected, removed with greater avidity by vegetation in spring and summer, than in autumn and winter.

13. WOKING.

We refer, in conclusion, to an experiment in sewage irrigation on the slopes of poor sandy soil below the invalid prison at Woking. A population of more than 1000 adults there receive a water-supply of upwards of 20 gallons a-head, equal to about one ton daily to every ten persons. The whole drainage of the place passes through a tank capable of holding about 1500 cubic feet or 40 tons of water; and thence it has hitherto flowed almost entirely to waste, being used, however, in an unsystematic way to fertilize the grass fields at the foot of the hill. Two acres upon the slope, in four consecutive plots a-piece, were laid out in the spring of 1869, so that a tankfull could at any time be poured upon the upper or any other plot of the series, the tail water being directed on any other plot of the series lower down. The four plots of one acre were sown with Italian rye-grass in March, and three crops, averaging more than 12 tons each, were cut during the following summer, the plant having been repeatedly sewaged during the intervals. The other acre lying in fallow was sewaged in the same way, and samples of the effluent water have occasionally been taken both from plots growing rye-grass and from plots without a crop, in the hope that we should ascertain the increased power of a surface covered with a growing crop as compared with one which depended solely on the soil as a filter. The second acre has subsequently been planted with cabbages, potatoes, and mangold wurtzel, and these crops have received sewage when the plants required it. The difficulty of applying the results obtained here to the circumstances of any other case arises from the extreme hollowness and porosity of the Woking soil. A dressing of 40 tons of sewage, poured in three-quarters of an hour from the upper carrier of one of these quarter-acre plots, is, notwithstanding the steepness of the slope, almost all absorbed before it reaches the foot of the plot. It is only when the land

is saturated with rain-water, and thus loses its power of absorption, that the sewage-water poured on at top, and conducted over the four plots in succession, of the acre then being treated, will reach the bottom of the field. In the interests of the crop it has been therefore necessary to irrigate each plot in succession with raw sewage. The plan has generally been to give each acre so much sewage in the week as to make the result correspond to the allotment of an acre to every 100 persons throughout the year; and in the further prosecution of the experiment here, when the soil shall have become more clogged with root fibre and with sediment, it is hoped that the effect of the whole acre upon a specified quantity of sewage may be realized and observed. The experiment has also to be extended to other places, in order that we may learn from it, if possible, the maximum powers of various soils in cleansing sewage, getting results of the same definiteness in regard to irrigation, as our laboratory experiments have already given us with reference to filtration.

From our results at Woking it may be stated that the fertilizing power of sewage water thus applied, that Italian rye-grass sown in March on poor Woking sand, yielded between July and October, three crops of grass, averaging more than 12 tons per acre each; and that on plots of similar soil the heaviest and most luxuriant growth of savoys, kale, and cabbage has taken place. A bed on which 20 tons of Woking peat had been laid one foot deep and watered in like manner, yielded as abundantly as the rest; and the result is sufficiently encouraging to justify the prosecution of the experiment on a larger scale, and on peat of a less questionable character, in order to ascertain, in the interests of the great Lancashire towns, whether sewage upon a true bog peat will feed succulent vegetable growth as successfully as it has been found to do on all other kinds of soil.

*AGRICULTURAL CUSTOMS.**

By WILLIAM FOWLER, Junior.

VARIATIONS OF CUSTOMS.

The "custom of the country," in the ordinary acceptation of the term, is understood that traditional which must regulate the mode of a farm when no written agreement to the contrary, might safely be pronounced a delusion and a snare. Not only a custom itself vary, in the most singular manner, as between one county and another; but even adjacent parishes, and even private estates, have customs of their own, all more or less obscure. It is a common mistake to suppose that, as a man may leave as he enters, after having occupied a farm for a long series of years during which time, if he is only a very good and decent tenant, he cannot fail to leave his farm into a good state of cultivation, however wretched may have been its condition when he entered, he is nevertheless in the last years of his tenancy, in as good a state as possible reducing everything to the state of desolation as that in which it was left by the previous tenant. He understood that this universally recognised principle would bear no such unreasonable construction. He understood it simply this: that if a man enters upon his farm at Lady-day, at Lady-day he shall leave it, if, when he entered, the previous tenant took the whole or any given proportion of great crop, on the same terms shall he take it if the hay and straw were taken at a consuming price, so shall he leave it to the incoming tenant; that if at the termination of his tenancy he was permitted to enter, say at Candlemas-day, to plough the spring crops, so shall he grant the privilege to the incoming tenant, and regard to other similar matters. But

read before the Midland Farmers' Club.

to suppose that, because the previous tenant left the land foul, and the whole farm in a desolate condition, a tenant would be justified, after years of occupation, in quitting the farm under precisely similar circumstances, was utterly unreasonable. There was, moreover, this further difficulty, that nineteen times out of twenty, after a moderately long occupation, no living man, except the tenant himself, knows the circumstances under which the tenancy commenced. Even the time of entry upon the farm—a most important circumstance in the absence of a written agreement—is frequently a matter of doubt; and the outgoing tenant is often in a position to set up almost any kind of claim that his conscience will allow him to make. These difficulties might all be obviated by the simple expedient of having a written agreement which shall specify the time of entry, the amount of rent, and the terms on which the tenancy shall be terminated; and these were, in his opinion, almost the only real uses of an agreement. No covenants on earth, however stringent, would make a man farm well; but if an agreement were carefully drawn, it would at least prevent the possibility of any serious dispute at the termination of the tenancy. The custom of relying upon the "custom of the country," instead of a written agreement, was, in his opinion, "a custom more honoured in the breach than the observance."

LOCAL CUSTOMS.

Having said so much upon the general aspect of the question, Mr Fowler proceeded to remark upon the local customs prevailing in the immediate neighbourhood. On the Staffordshire side of Birmingham, what was generally known as the "Staffordshire custom" almost universally prevailed—that was to say, the tenancies nearly all terminate at Lady-day; the outgoing tenant taking

away two-thirds of the fallow wheat and one-half of the turf wheat, and being paid for clover seeds, winter ploughing, carting and spreading manures, pleaching hedges, &c.; and also the consuming value of any hay, straw, or roots which may be left on the premises. This was, upon the whole, a convenient and equitable mode of quitting, and it was one that he introduced wherever the opportunity occurred; and where it was combined with a written agreement which required the off-going wheat crop to be taken at a valuation, and paid for by the in-coming tenant, it appeared to him to be almost entirely free from objection. He could not approve of any agreement or custom which did not give to the in-coming tenant the absolute and sole occupation of the farm from the day on which his tenancy commenced. Where this arrangement did not exist, difficulties and disputes were liable to occur. When the off-going wheat crop is not purchased by the in-coming tenant, the out-going tenant must reap the whole crop, and then the stocks of corn must be divided in the relative proportions belonging to each person respectively. Sometimes the out-going tenant will claim as fallow wheat two-thirds of that which may be grown after turnips. This he always resisted, because the turnip ground ought to be left for the in-coming tenant to sow with barley; and unless it should have been quite necessary to sow some portion of the turnip ground, in order to make up the proper off-going quantity of wheat, he would only allow seed and labour, and even that unwillingly. The off-going tenant would sometimes claim to be allowed the consuming price of the straw of off-going wheat crop, and this might become an extremely difficult question, because if he could shew that he paid the consuming price of the wheat straw when he entered, he would be entitled to the same allowance on quitting; but it must be borne in mind that if he is entitled to be paid the consuming price of the straw it followed that he is entitled to consume it on the premises, if the in-coming tenant will not consent to give the price demanded for it. In his opinion the straw of

the off-going crop should always be deemed the property of the in-coming tenant. Then, again, the wheat crop is held to be until harvest in the possession of the out-going tenant, who may lock the gates of the fields, and refuse to allow the in-coming tenant to hoe the wheat even at his own expense. All these difficulties might be avoided by a written agreement. He was not aware of any special custom in Staffordshire with reference to a Michaelmas quitting. Customs, he believed, were much less common in that county than in Warwickshire or Worcestershire. In North Warwickshire there was, so far as he knew, no well-defined general custom. A man always leaves as he entered, and there were hardly two cases exactly alike. The majority of tenancies commence at Lady-day, but many also at Michaelmas. In the former case, when the Staffordshire custom is not adopted, the out-going tenant generally takes the whole of the fallow wheat, paying sometimes a year's and sometimes only half-a-year's rent, tithe, and taxes, upon the land on which it was grown, and receiving also the cost of seed and labour for the brush wheat. In other respects, the conditions of quitting would be very similar to the Staffordshire custom. Sometimes the straw is left without compensation, and sometimes it is paid for at a consuming price. In the case of a Michaelmas quitting, the out-going tenant generally has the use of a room in the house, and in some cases the whole of the house, till the following Lady-day. In that part of Worcestershire lying near to Birmingham there was a local custom, extending over perhaps five or six parishes, where the out-going Lady-day tenant takes the whole of the wheat crop, paying to the new tenant 6s. 8d. per acre for the fallow wheat, and 13s. 4d. per acre for the brush wheat. Sometimes the outgoing Lady-day tenants pay the half-year's tithe rent-charge to Michaelmas on the wheat land; but this is only where it is clear that his predecessor did the same.

OBJECTIONS TO CUSTOMS.

Half the questions connected with the quitting, here and elsewhere, were determined rather by the alleged mode of entry in each

particular case than in accordance with any recognized general custom. This was one of the great objections to relying upon custom for the manner of quitting a farm. It was almost a necessary result, that in dealing with an out-going tenant, who happens to be a troublesome or unprincipled man, the incoming tenant is forced to pay him on quitting far more than he is really entitled to, because, in most cases, the out-going tenant alone knows how he entered, and may allege anything he pleases, which would be generally very difficult to rebut, however unreasonable or improbable it might be. It is of course just as possible for the in-coming tenant, or the landlord, if there be one, to be awkward and unreasonable too.

NECESSITY OF AGREEMENTS.

Having referred to existing customs, it would, perhaps, be expected that he should offer some suggestions on the possibility of amending them. He felt this to be very tender ground ; but he should bring the paper to a very lame and impotent conclusion if he did not venture to give some kind of an opinion upon this, the most important, feature of the question. He would state at the outset, that he did not desire to see the "custom of the country"—meaning thereby the unwritten custom—extended beyond its present limits. Any allowances for improvements, of whatever kind they may be, should be the subject of a carefully-written agreement, or great difficulty and mischief may arise. With the proviso that no man shall be entitled to such allowance by virtue of any alleged custom, he should be glad to see, within reasonable limits, a general practice prevail of compensating an out-going tenant for any outlay on his part from which he has not derived a fair and adequate return. It was obvious, however, that the details of such an arrangement must be carefully considered, and the limits accurately defined. It must not be forgotten that the landlord had some rights in the matter ; and, moreover, there was the in-coming tenant, whose interests were as much entitled to fair consideration as those of the tenant who was quitting the farm. With re-

gard to permanent improvements of all kinds, such as new buildings or draining, these should, if possible, always be done by the landlord ; the tenant paying an increased rent by way of interest on the outlay. Where a landlord is either unable or unwilling to expend money on such objects, permission in writing should be asked and given to the tenant to execute these works, with the understanding that the outlay shall be considered as spread over a given number of years, and that, if the tenancy shall terminate before that time has expired, a proportionate part of the cost shall be paid by the in-coming tenant. Such permission would of course not be given unless the necessity or advantage of the proposed outlay was apparent ; but if a tenant desired to erect buildings which, to the landlord did not seem necessary, there could be no reasonable objection to give permission to remove them at the end of the tenancy if the new tenant declined to pay for them. A legal difficulty might arise in certain cases where the landlord, being only tenant for life, could not bind his successor ; but this might be easily remedied by legislation. With regard to any allowance for purchased manures, or oilcake, or other food consumed by cattle, this was a question purely between the out-going and in-coming tenant ; and he saw no objection to making it part of the ordinary agreement for letting a farm that, under certain conditions, and within defined limits, a reasonable allowance should be made to the away-going tenant on quitting his farm. It was essential, however, that this system should not be carried too far, and that such allowances should be carefully restricted, so that the in-coming tenant might not have to pay for anything from which he would not derive a clear and palpable advantage. Any allowance for manures ought to be strictly confined to such as are used, not in lieu of, but in addition to that which arises from the consumption of the produce of the farm. No manure should be allowed for, under any circumstances, which has been used upon corn crops ; and the allowance, whatever it may be, should be confined to the last year, or at most, the last two years of the tena

except in the case of bones applied to grass land, the advantage of which would extend over a period of several years. It would be necessary also that the character of the manures, and the proportion of the cost thereof to be allowed for, as well as the kind of crops on which they may be used, should be carefully specified. With regard to cake and corn consumed by cattle, he was willing to admit that some allowance might fairly be claimed; but the proportion allowed for ought to be small, and the allowance should not go back further certainly than two years, and he was rather inclined to think only for the last year of the tenancy. Let it be clearly understood that the object of such allowances was not merely to enable an off-going tenant to put a large sum of money into his pocket when he

quits his farm, but rather to promote a better system of cultivation, and to provide that the incoming tenant shall pay his fair proportion, but no more, for the advantage which he did undoubtedly derive therefrom. Such a system, however, if carried to an undue and unreasonable extent, might entail an unfair burden upon the incoming tenant, and ultimately involve the landlord in the most unpleasant consequences.

It is every man's duty, and ought to be his pride, on quitting a farm, to leave it in such a state that he would not himself object to take it; for, in farming, as in every other vocation in life, "Do as you would be done by" was the truest principle of action; and the soundest maxim, "Honesty is the best policy."

THE LATE PROFESSOR SIMPSON.

A GREAT man has been gathered to his fathers. In his own particular line, one greater has crossed the bourne whence avellers ne'er return than Sir J. Y. Simpson. His name has long been a household word in every civilized country where men and women have children born unto them, and revered wherever the unnatural doctrine of falthus is, as it ought to be, a dead letter. Many a happy home, it may almost be said, was created by him. Under his fostering care, young shoots have been made to spring up in freshness and beauty from trunks that have been considered wellnigh withered and dry. And as the inventor, or at all events the first applicator, of chloroform — under whose sedative influence the most excruciating pains were unfelt—he was entitled at his death to receive the highest honour which his countrymen, and those in other lands who benefited by his anæsthetic, had to bestow.

The public paid justly, and to the full, the tribute that was due to his name. Never before, we believe, did such a concourse of distinguished mourners attend any one to his last resting place, nor so many sympathizing onlookers line the streets and crowd the windows along and beneath which the mournful cortège moved sadly and slow. As we watched the long sombre columns of people pass with measured tread, the fine lines of the late Rev. J. D. Burns about the burial of Jacob came vividly into our mind :—

It is a solemn cavalcade and slow,
That comes from Egypt ; never had the land,
Save when a Pharaoh died, such pomp of woe
Beheld ; never was bier by such a band
Of princely mourners followed, and the grand
Gloom of that strange funeral armament
Saddened the wondering cities as it went.

It may seem a little out of the province of
THE COUNTRY GENTLEMAN'S MAGAZINE,
thus to notice the death of a medical man ;

but Professor Simpson's was a career of such a nature as to justify, nay, indeed, command the attention of any journal. He was bred as a baker, and bakers are men to whom all farmers are greatly indebted. It is for them the agriculturists raise the produce which the public consume after its manufacture into bread. Besides, he was interested in the soil. As a geologist and as an antiquarian, the late Professor in his time turned over a large quantity of land, in some cases we are afraid with little pecuniary profit to himself, however much the benefit may have been to science. He dug down into the bowels of the earth for shale ; took, as it may be said, the crops out of the under-ground as the husbandman takes them off the surface, greatly to the advantage of those who sat in darkness and desired light ; and opened up the mounds covering the crumbled bones of the long-ago dead, in order to tell us what manner of men they had been in their day and generation, whose dust now fertilized our fields. In the palaces and castles of royalty and nobility, in the mansions of squires and country gentlemen, in the homestead of farmers, and the cottages of agricultural labourers, where a "difficult" case was, Professor Simpson was almost sure to be. And wherever he went, his genial, happy manner, imparted confidence alike to the patient, and those who, with tender, friendly hearts and hands, waited by and tended the sick-bed. One of our living poets described the late Professor's appearance very accurately, if not a little too personally, perhaps, when he said he had

"The body of Bacchus with the head of Jove."

He was, indeed, a man in person and in practice, that

"Take him for all in all,
We ne'er shall look upon his like again."

Peace to his ashes !

Farm Implements and Machines.

THE CUTTING OF REAPING MACHINES.

By Dr GUIDO KRAFFT.

IN the first reaping machines that attained any practical importance, cutting was the main operation performed by the machine, whilst the removal of the corn that had been cut by it was left to be effected by the hand of the person in attendance. It was only after progressive improvements of these machines that the latter work was made to be done by the machine itself. Nor is this surprising, if we consider that the apparatus for removing the cut material admits of a great variety of forms, whilst the construction of the cutting portion of the machines, which exclusively we propose to consider here, had already assumed a definite shape.

In the machines at present in use (for those with rotatory blades are now merely matter of history), the cutting results from a number of shears, whose blades are made either smooth (shear system) or serrated (saw system).

In both systems, one blade of the shears is generally made immoveable, and the other blade moveable; both are placed at the side, and attached to the carriage part of the machine.

The fixed blades (the fingers marked *a*), which, for the most part, are composed of malleable iron, are screwed or riveted to the front side of a forged iron bar, the length of which varies according to the number of fingers. The movable blades (the fingers marked *b*) are also composed of malleable iron, and are attached to the back side of a forged iron rim (the rim marked *c*) by means of two screws or rivets. The movable blade, and also the blade attached to the rim, are connected by a reciprocating motion

in the above-mentioned slot of the fingers, and within guiding cheeks, by a guiding bar of a reel, which is turned round through the mechanism of the carriage part of the machine. At the same time the whole cutting apparatus is drawn forwards by the animals yoked to the machine. The knives are consequently, at the same moment that they act laterally, also moved forwards. The nature and manner of this motion determine, in connexion with the number of shears, the beauty and regularity of the cutting. The surest data for estimating the style of cutting are afforded by the graphic representation of the same, and we give designs shewing the movement of the blades, from the report of the trial of reapers at Auburn,* in North America, which movement was then first introduced for particular machines, and has since been applied for the motion of the removing apparatus. At the same time we will investigate the work of cutting as performed by some of the more important machines, which we had an opportunity of observing on the occasion of the International Reaping-machine Competition at Altenburg, in Hungary, in July 1869.

As a preliminary to the comprehension of the diagrams of the movement of the blades, it is necessary to consider in what way cutting takes place in the machine.

When the introduction of the cutting apparatus to a standing crop there ensues, by the finger of the cutting apparatus, the stalks are separated into a number of sheaves or small sheaves corresponding to the number of fingers. On the further progress of the machine, these swaths or sheaflets slide

* Second National Trial of Mowers, Reapers, &c., by the New York State Agricultural Society, at Auburn, July 1866. Albany, 1867.

sharpened edges of the fingers into
r between the blades and the fingers,
here compressed by the pressure of
on the edge of the finger, and finally
y the passage of the knife through the
ie finger. By a corresponding velo-
ie blades, which, in the case of saw-
s, can seldom happen, and must be
the stalks have not time to escape
g operation, a portion of the stalks
ut without having been first pressed
ger. But this degree of velocity is
tained.

construction of the designs, the
f the stalks standing on the spot,
the velocity of the blades on the
not taken into account, and the
proceed on the supposition that the
s only the stalks pressed against the
he range of the blades, consequently,
only to half of the breadth of the
ince the fingers divide the standing
The chief points to be considered, in
rative estimate of reaping-machines
ollowing :—

I. THE FINGERS.

umber of fingers on a particular
o be mown, or distance of the parti-
ers. To this distance the breadth
portions of the blades corresponds.
orm of the fingers, namely, their

II. THE BLADES.

Shape and size of the Blades.

ount of the angle, which the edge
lade makes with the edge of the
with the direction in which the ma-
lawn by the horses.
eight of the blades, or length of the
lges.

b. Motion of the Blades.

elocity of the knives, expressed
he progress they make by the ad-
the machine through a definite unit
(1').
unge of the horizontal sweep of the

woodcuts the ends of the finger-beams have
ed by two small strokes only, not to make
perplexing by too many lines.

(7.) Length of the guiding bar, expressed
in a multiple of the length of the arm of the reel.

The above cited factors should give, when
properly combined, the greatest possible
evenness and flatness in the cutting, with the
least expenditure of power in the traction.
This can only be effected, leaving out of
account the inevitable loss of force from fric-
tion, when the stalks, without first having to
be bent, are as much as possible cut there
where they stand, and when the surface,
already cut, is not a second time exposed to
the sweep of the blades.

In the machines which we have inspected,
the following measurements were taken in
regard to these points :—

Machines (Self-Movers).	
Brighton & Bickerton's "New Patent X. L. Reaper" Samuelson & Co.'s "Man- writing's Patent Model A" Richard Hornsby & Sons "Governor" James & Frederick Howard's "Two-wheeled Combined Reaping-Machine," saw- blades MacCormick's "Saw-Blades" Lilpop, Rau, & Co.'s "Var- saw Saw-Blades"	
3" 2" 11" 3" 3" 3"	Distance of the Finger Points.
1" — 1" 10" 2"	Breadth of the Fingers.
24° 27° 27½° 31° 60° 71°	Angle of Shearing.
2" 10" 2" 8" 2" 8" 2" 3.5" 1" 8" 2"	Length of the Cutting Edge.
19.7" 17.9" 15.8" 15.8" 14.2" 19.4"	Amount of Stroke of the Blades by 1' of advance of the Machine.
2" 1" 3" 10" 3" 6" 2" 3" 2" 6" 3" 8"	Progress of the Machine during One Stroke.
3½" 5¾" 4½" 3" 3" 6"	Horizontal Stroke.
9.5 8.3 9.3 15.3 5.4 9.7	Length of the Guiding Bar to the Length of the Arm of Windlass $\frac{2}{3}$.

In the designs of the movement of

blades, which, on the basis of the data above given, are represented about $\frac{1}{3}$ less than their actual size (in the woodcuts about $\frac{2}{3}$ less), the surfaces, on which the stalks are, that are cut down on the very spot on which they stand, are shaded in lines, or hatched, the surfaces which are swept over by the two blades are shewn as dotted, and the surfaces on which the stalks must first be pushed, or bent sideways, before they can be cut, are represented as white. The sizes of the particular surfaces, reckoned by means of large meshes $1 \square''$, are appended.

Machine.	Of a measured surface there has been actually reached by a cut,							
	In Square Lines.				Per-centage.			
	Surface.	Once.	Twice.	Not cut.	Once.	Twice.	Total.	Not cut.
Brigham	198	132	60	6	66.6	30.4	97.0	3.0
Samuelson ...	330	158	162	10	47.8	49.2	97.0	3.0
Hornsby	288	235	18	35	81.6	6.3	87.9	12.1
Howard	216	171	11	34	79.1	5.2	84.3	15.7
M'Cormick..	236	141	0	95	59.7	0.0	59.7	40.3
Lilpop	894	597	0	297	66.7	0.0	66.7	33.3

A cursory inspection of the diagrams and preceding tables shew what machine has the advantage in giving the finest cut.

The machine of the firm Brigham & Bickerton (fig. 1), gives, theoretically at all events, the best cut; Samuelson's machine (fig. 2) comes next to it. In actual work in the field, these machines have not been equalled by any other in regard to the beauty and regularity of the cut. The stubble left behind had the appearance of being shaven.

A comparison of Brigham's machine with Samuelson's, demonstrates in the clearest way what influence the height of sweep and the velocity of the blades exercise on the nature of the plan, as all the other points of comparison in the cutting apparatus of these two machines are nearly the same in each.

Brigham & Bickerton employ a less height of sweep for their blades, and consequently a less velocity, which, according to the first column of the table (column 5), corresponds to a less number of revolutions of the reel-shaft, and one of 19.7 for each foot of

advance of the machine. Samuelson attains, through an increase of the sweep, of about 2.4" as compared with Brigham, along with a less number of revolutions (1.56 turns for 1' of ad-

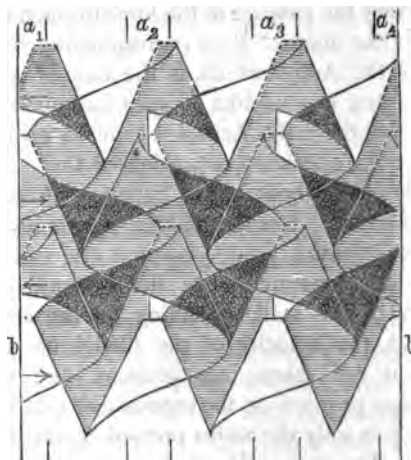


Fig. 1.—Brigham & Bickerton's New Patent X.L.

advance of the machine), a range of the blades for the same time of 17.9".

Although an increase of velocity of the reel is attended with increased losses of force namely, through the shocks against the groove

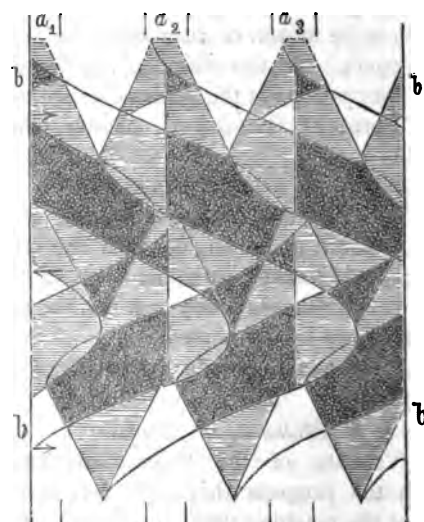


Fig. 2.—Samuelson & Company's Manwaring's Patent Model A.

in which the guiding bar works at each change of the direction of motion, yet the advantage attending a less velocity of the reel in Samuelson's machine is, in gre

asure, counterbalanced by the increased
gth of the reel-shaft (which necessitates
the cylinder of the reel should lie higher
ve the back of the blades), whereby a loss
orce through increased friction ensues.

crease of the sweep, accompanied at the
same time by diminution of the rate of re-
volution of the reel, and lessening the angle
of shearing, gives, as respects the latter
machine, 3 per cent. greater extent of surface

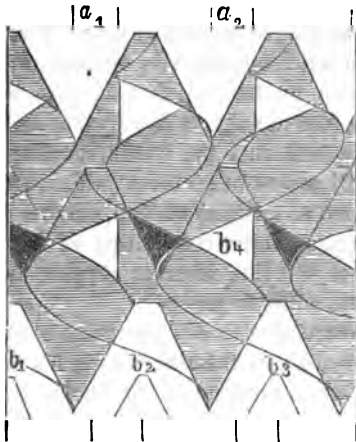


Fig. 3.—Richard Hornsby & Son's "Governor" Reaping Machine.

The increase in the height of sweep in
nuelson's machine occasions also a further
inution of useful force, through the cor-
ponding increase in those surfaces which
shewn as dotted in the figure, and on

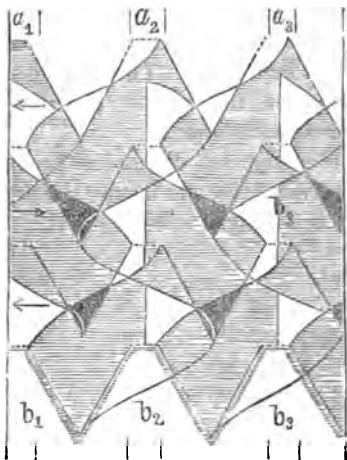


Fig. 4.—J. & F. Howard's Combined Reaping Machine.

ich the two directions taken by the blades
lessly cross each other.

When we compare the diagrams of the
chines of Hornsby (fig. 3) and Howard
(. 4), we find that the former, by the in-

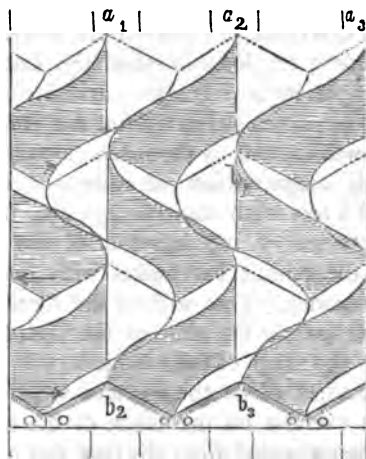


Fig. 5.—Burgess & Key's 'McCormick's' Reaping Machine.

on which the stalks are cut on the spot. An
increase of sweep in Howard's machine would
be attended with the least possible prejudice,
as Howard makes the guiding bar in his two-
wheeled machine 15.3 times the radius of

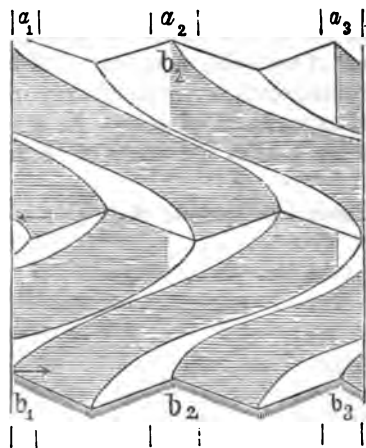


Fig. 6.—Lilpop, Rau, & Co.'s 'Warsaw' Reaping Machine.

the reel. This conducts us to another ele-
ment on which the beauty of the cutting
depends.

After the above survey of the influence
exercised by the varieties of construct'

already discussed on the cutting, it remains to be stated that, besides the height of sweep and velocity of the knives, the length of the guiding bar produces a certain, if not an important effect, since the curve of the motion which a particular point of the back of the blades describes, in consequence of lessening the guiding bar, loses in symmetry, inasmuch as it experiences a greater curvature at the beginning of the sweep than at the end. In the power exerted by the machine, there is a sensible augmentation of resistance in the case of a too much shortened guiding bar, in consequence of the increase of the angle which the guiding bar makes with the back of the blades. This will be the more striking, the greater the arm of the reel, or the greater the range of the machine.

The effect which the *size* and *shape* of the blades exercise on the nature of the cutting may be estimated from the fact, that a small angle of shearing and a great edge, which is conducted perpendicularly on the course of the knife, determine the best results.

With an equal sharpening of the cutting edges of the blades, we get a form such as M'Cormick and Lilpop employ, requiring less power than a form adopted by Brigham, Samuelson, &c.; but the danger of the stalks slipping out of the blades, or sliding under the back of the knife, increases. The cutting must consequently, even though requiring increased expenditure of power, be the more perfect the smaller the angle of shearing is taken.

M'Cormick's machine (fig. 5) which, as

just remarked, was favourably distinguished for its removal of the stalks, exhibits a design which must be pronounced as decidedly inferior, if considered as a system of shears. The blades of this machine, however, are constructed according to the saw-system, and must be judged in another way. The cutting of this machine was very satisfactory, which is shewn by the fact, that the serrated edge, which (see the figure) has a white surface before it, and cuts the stalks standing on the spot by means of its teeth (which are to be regarded as so many blades), without the help of fingers, whilst the cutting of the second edge of a blade receives support from the corresponding finger.

Howard also employs serrated blades with a small angle of shearing; but in his machine, the file-like progress of the blades is of less consequence; it is of much more importance through this smallness of angle to keep the edges as long as possible sharp.

In respect of cutting, Lilpop's machine (fig. 6) must give place to M'Cormick's machine, notwithstanding that the extent of the white surface is a little less, as this result is only attained by a greater sweep. The course of the blades, which runs so obliquely with respect to the direction of their cutting edges, made this the least favourable of all the designs here given. This machine is also unfortunate in the greater distance of the fingers from each other.

Not to carry this discussion beyond due limits, we will leave the further consideration of the above designs to our readers.

The Farm.

FARMING IN NEW BRUNSWICK.

AT the present time, when there is so much agitation about emigration, when, in fact, the discussion about it has become so keen in some quarters, that passion and prejudice may almost be said to have usurped the reins of judgment, we think it advisable, for the benefit of our readers, to extract from the columns of *The Field*, the following very sensible letter signed "Cariboo," upon "Farming in New Brunswick." The writer manifestly knows his subject; he writes clearly and interestingly upon it, and we should say from the tone, "nothing extenuates nor aught sets down in malice."

NOTION THAT NEW BRUNSWICK IS NOT A FARMING COUNTRY.

New Brunswick is not a farming country such, at least, is the character it bears, and consequently there is little or no emigration to the province. The vast army of emigrants that year after year crosses the Atlantic, leaving the British colonies to one side, pushes on farther west, and distributes itself among the great cities and the fertile prairies of the United States. Without pretending to the gift of prophecy, I may fairly predict that at a future period something will occur to divert this stream of emigration elsewhere; and, looking forward to this contingency, it might not be amiss to glance at this howling wilderness, and see why "New Brunswick is not a farming country." Is it impossible to clear the land? When cleared, does it not yield good crops? Is the climate too severe? Are the markets too remote?

With an area of about 20,000,000 acres, New Brunswick has a population of about 250,000, or, deducting the population of the city of St John, one to every 100 acres. If the province was equally partitioned out

amongst the adult males, each one might have a farm of 500 acres. But every man in a country cannot be a farmer—some must be shoemakers, tailors, &c.; even doctors and lawyers are necessary evils. With this scanty population it does not seem so strange that nine-tenths of the province is still forest; nor is it to be wondered at that, a casual visitor, seeing this primeval forest, should carry away with him the impression that "New Brunswick is not a farming country."

But this population, small as it is, does not live by agriculture. Like the Americans, they look upon farming as too slow a means of making money, and prefer occupations which, together with greater risks, combine quicker returns. Both these desiderata have hitherto been supplied in the lumbering and ship-building trades; but now, iron ships are taking the place of wooden ones, the lumber trade is depreciated, and farming, if farming can be made to pay, must be gone into largely.

WHAT FARMING HAS DONE IN NEW BRUNSWICK.

The best way to judge what can be done is to look at what has been already accomplished by the comparatively few individuals who have devoted themselves entirely to the cultivation of the soil. These men, so far from being worse off than their neighbours, are invariably more prosperous and well-to-do; they cannot, it is true, amass fortunes, but they can live well and comfortably, and give their children a fair start in life. In travelling through the province, if one sees a more than ordinarily comfortable and prosperous-looking homestead, one may be quite sure that it belongs to a man who is not at all unskilful in farming. This fact tends to up

notion that New Brunswick is not a farming country ; and, looking more closely into the matter, comparing the crops grown here with those of other countries, and weighing well the drawbacks of climate and the difficulty of clearing the land, I am led to the conclusion that at a future period New Brunswick, stripped of its forests, will maintain by agriculture a population proportionate to its area.

With the rich prairie lands and the semi-tropical climate of the south-west it would be folly to attempt a comparison. These regions would be the El Dorado of the farmer were it not for certain drawbacks in the shape of scarcity of labour, heavy taxation, and the disturbing influences of the late civil war. In British America, the difficulty of procuring farm labourers is also felt ; but, on the other hand, taxation falls lightly on the farmer—in no part of the world can he enjoy greater security of life and property, nor a healthier and more invigorating climate. These advantages, combined with great and growing facilities for marketing his produce, go far to counteract the hard labour of clearing the land and the shortness of the farming season.

CHARACTER OF LAND, CROPS, AND MARKETS.

The land may be divided into three lots, viz., upland, intervale, and swamp. The latter, so far from being low-lying, is often the highest land in the province—either cariboo barrens clothed with lichens and stunted bushes, or else densely wooded with spruce, fir, and cedar ; for farming purposes it is almost useless. The best farms contain a certain portion both of upland and intervale. Stock has to be housed and fed for nearly six months ; but Nature, as a set-off against the length of winter, gives most bountiful crops of grass. The intervale lands along the rivers and lakes are periodically overflowed by the freshet, and dressed by the sediment as remains after the waters have receded, and the rich soil, without cultivation, yields an abundance of hay. Nothing strikes the stranger more forcibly than the rapidity of the vegetation : hardly has the snow vanished, when the trees burst into foliage as if by

magic ; and the grass—I was going to say you could see it grow—but this I can say, that I have seen a first-rate crop of hay cut off a field that seven weeks before was as bare and brown as a worn-out carpet. •

Excellent crops of wheat are grown in parts of the province, chiefly on the Bay of Chaleur ; with a better system of farming I believe it could be universally cultivated with success. Barley is not grown, chiefly for want of a market. Oats and buckwheat are the staple cereals, and these grow to perfection. I have threshed 70 bushels of oats, weighing 40 lb. to the bushel, off one English acre of land. Buckwheat grows almost wild, and is a most useful crop to the farmer ; the meal quite takes the place of oatmeal, even of wheaten meal, at his table, and the bran fattens pigs and poultry quicker than almost any other sort of feed. Turnips, carrots, parsnips, beets, mangolds, and potatoes, grow to perfection, but the latter root only is largely cultivated ; all the others, requiring hand labour, are considered too expensive for field crops, and are merely grown in small quantities. Potatoes may be said to be a certain crop ; not only do they grow luxuriantly, but they are scarcely, if at all, affected by disease. Californias, a very large but coarse variety, take the place of turnips for stock feeding. All the vegetables grown in English gardens do as well or better here. Cucumbers, pumpkins, and tomatoes ripen in the open air, and so does Indian corn, which, however, is only grown as a garden crop. Melons and grapes require a little forcing.

The market for farm produce is very good, and can never be overstocked, for the large cities of the Northern States will always be glad to get any overplus that New Brunswick may have to dispose of. The facilities for sending goods to market are, as I have said before, unsurpassed. Besides roads, which are numerous and tolerably good, the whole province of New Brunswick is intersected by rivers and lakes ; many are navigable in summer, and all form capital roads in winter when bridged over by the frost. Railways too are springing up in all directions ; the feelings of the moose and the cariboo are

Farming in New Brunswick

shocked by the scream of the locomotive. There will very soon be direct rail-communication with Quebec, Halifax, Scotia, and the United States. The line of the province is of great extent—400 miles—with innumerable good rivers. The inland navigation is considerable. Steamers run 200 miles up the St John River, 80 miles at all times. The rivers are a great source of wealth; but I say nothing further on this head here, as a pursuit incompatible with farming, the same might be said of lumbering.

CLIMATE.

As regards the climate, the principal drawback—and it is a serious one—is, that the work which the English farmer spreads twelve months must in Canada all be compressed into six or seven months. It is said an acre will yield as good or better crops in an acre of equally good land in England. Considering the advantages and disadvantages of climate, there are several things that be set against the length and severity of winters—amongst others, the pulverization of land by frost, which saves labour; the number of days in the season in which the farmer is impeded in his operations by frost, and, consequently, the ease and rapidity with which he secures his crops; great amount of sun in summer, and rapid vegetation.

The long winter itself is not wholly at its disadvantages; it affords the farmer facilities for hauling firewood, manure, hay, rails, &c., on sledges, and the long keeping of his stock enables him to accumulate a larger pile of manure. Although extensive lumbering operations are incompatible with farming, there is no reason why farmers should not in winter cut and haul materials for building purposes, fences, &c.; on the contrary, no farm should be without a certain quantity of forest at its back, which may, little by little, be cleared, and in the meantime furnish necessary lumber and fuel in winter, and pasture for young cattle in summer.

NUMBER OF MEN WANTED IN NEW BRUNSWICK.

In the first place, it is a capital country for

working men. If wages are not so high as in the States, they are actually higher because living is one-third less. A working man, accustomed to farming in the States, can earn from 10 to 15 dollars a year round, with his keep, and in three years save enough to commence on his own account. It is not so in these countries (are there any such?) where a man can invest a small capital in land, and in a few years make a fortune; but it is in those in which a man with a certain sum can live much more comfortably than in England, have some shooting and do everything that he sees his neighbours doing, which I believe to be a mistake here, as for a man with little or no idea of farming, to rush out and invest all his capital. He should rather take plenty of time to get about him, and in the meantime get from 6 to 8 per cent. for his money. Good cleared farms, with houses and outbuildings, can be bought, stocked and cleared for about £1000. The very best thing a gentleman can pursue is to get a good farm for him on shares. This is done to the owner's eye, and guided by him in all matters of importance, cultivate the land, and pays the labourer, receiving for his share one-third of the crops, or an equivalent.

PRICE OF UNRECLAIMED LAND.

Wilderness lands can be bought for three shillings an acre. In choosing the land the settler is guided by the timber, the black birch, maple, and beech grow on the best land. The trees are felled and then burnt. The stubble comes out for seven years, but in the eighth year a crop of oats and another of wheat is taken off the land without manure; it is then laid down in grass for the remainder of the time. Fuel is inexhaustible in the form of wood and coal; the latter crops on the surface in some parts of the province and is sold in the city of St John for about 10 shillings a chaldron.

THE MANURIAL VALUE OF TOWN SEWAGE.

not the whole of the sewage taken to the farm, but only to that portion of it to which it is necessary to apply it. We do not overlook the fact, that the enthusiastic advocates of sewage maintain that this view will not be a deterrant one, inasmuch as they hold that it—the sewage—can be applied not only in much larger quantities to grass lands than has hitherto been considered safe, but to all crops, and even to fallow land. On the other hand, the best authorities doubt this universal application of sewage, and so far from going with it, express the wish that extensive experiments were carried out, to test practically to what land, and to what crops, the sewage is really applicable; a wish which obviously includes this fact, that such extensive and authoritative experiments have *not* been carried out. So the farming community have yet to wait for further evidence on this point. Further, the manurial value of sewage is influenced by this fact, persistently overlooked by some, that its fertilizing constituents are constantly varying; thus the value of sewage at one part of the day in London, as tested by a great number of experiments, was different from that of another part of the day; and it is obvious that the sewage of one town may be much richer or much poorer than that of another; and further, that in very rainy seasons, the amount of rain water passed into the sewers must deteriorate the value of the sewage. But, as we have before hinted at, the art-and-out advocates of sewage hold that the fact that the sewage is a liquid is altogether in its favour, as it can be, in consequence, sent into the country and taken to the farm at a very cheap rate. Thus it has been estimated, that if a ton of any manure be sent a certain distance, say for 1000 yds., for the same sum no fewer than 72 tons could be sent the same distance. It is obvious that the point to decide the value of this statement rests upon the relative value of the

10 manures—72 tons of sewage at 1d. a ton, set, for example, against a ton of Peruvian guano at £12, 10s. a ton. But this delivery of the 72 tons only includes its delivery to the outskirts of the farm, and does not include the cost of the distributing apparatus, which, be it remembered, *must* be put down before the sewage can be used. Mr Lawes, referring to this illustration of the much greater bulk of sewage which can be conveyed for the same amount of money, as against the

conveyance of a solid manure, disposes, however, of it thus :

If the seventy-two tons weight of sewage were so diluted with water, as researches have as yet shewn that they are, it would only contain about seven-eighths of the average annual excrement of one individual ; and the most ardent admirer of water would perhaps agree with him that the extra cost of 9s. or 10s. would be paying rather dear for the solution of 5s. or 6s. worth of manure.

TURNIP STORING.

THIS is a part of farm work which is very much neglected. Farmers, as a rule, are, perhaps, a little too greedy in connexion with this valuable root. If the growth has been backward in the earlier part of the season, and in the end of the year we have mild forcing weather, as we occasionally have, cultivators are too apt to leave storing over, in order that the bulbs may have the chance of attaining a large size. It is natural to try and make up at the end the loss incurred through unpropitious circumstances at the beginning; but, in nine cases out of ten, the delay is not judicious. In our variable climate, little dependence can be placed on the weather, even in the summer months, and none at all upon the three winter months. A mild moist day in December may be succeeded by a hard frost at night, and the consequence of that to turnips unsecured is ruinous. "Better small fish than none" is an old saying, and it applies well in the case of this particular root crop. A ton of small healthy bulbs is worth double the quantity of large fozy ones. Far more; in fact they are worth every thing, while the latter are worse than useless; they injure the stock which is fed upon them.

But apart from these facts, it now appears that turnips left uncovered, even if they escape deterioration from the weather, lose weight in comparison with those which have been pitted. This has been fully established by Mr Bruce of Longside, who gained the cup

for the best turnips at the Buchan Agricultural Society. In reporting about these prize roots he says:—

The turnips, which were awarded the cup in the Buchan Agricultural Society's competition, were weighed and put into pits on the 13th December, and on being taken out of the pits on 3d March, and re-weighed, were found to weigh exactly the same as when first weighed and pitted. The turnips were also quite fresh.

An imperial pole of turnips, grown alongside of those pitted, were weighed at same time, and found to have lost 4 tons 3 cwt. The bulbs were quite fresh, but soft on the top. The field on which they were grown stands at an elevation of 300 feet above sea level, and has a northern exposure.

An imperial pole of the turnips grown by Mr Bruce of Longside, at Inverquhomery, and which gained the first prize in the same competition, were weighed on the same day (3d March), and found to be minus 6 tons.

Mr Bruce is convinced from his experiment that by storing he has saved 26s. per acre clear; the total saving on the pitted over the unstored roots being 30s., the expense of storing 4s. To thoroughly test the advantages of storing, Mr Bruce has resolved to continue his experiments over a series of years, in order to ascertain the effect of different seasons. Meanwhile, we think the experiment reported, in conjunction with the disasters which year after year follow upon dilatoriness in securing this crop, ought to determine farmers not to leave turnips exposed so long in the future, as they have often done in the past.

WO HUNDRED AND SEVENTY YEARS OF THE WHEAT TRADE.

WHO would have thought in a space of time approaching the age of the patriarchs, and in a business so various the corn trade, that there be men now among us who have seen prices fluctuate to a greater extent within the last century than did in the 200 years before, and that there were witnesses of the highest prices recorded during the whole period? Yet such is the fact. The highest price realized in the course of all that long time was in the thirteenth year of the present century, or twenty years after the overthrow of the Bourbon dynasty and thirteen after Napoleon was appointed to rule over the destiny of France. The wheat then (1812) rose to 2s. 8d. per qr.—12s. 3d. more than the price of it in the opening year of the century, or 1s. 9d. per qr. more than in 1801.

The year 1600 opened with wheat standing at 17s. 8d. per qr.; in the next decade, it had some fluctuations fallen to £1, 15s. 10d., though in the course of that period, in 1608, it made as much as £2, 16s. 8d. In the succeeding ten years it rose and fell considerably but 1620 left it standing at £1, 10s. 4d.; the next decade and we find the price up to 15s. 8d.; in the succeeding year, 1631, it reached the value of £3, 8s. per qr.; from that gradually declined until in 1640 it was £2, 4s. 8d. per qr. An enhancement of price then took place, doubtless owing to the quarrel of Charles I. with the Commons, the consequent disturbed state of the country; and at the close of the first half of the 17th century wheat had attained the average price of £3, 8s. 1d. per qr. In 1660, it decreased to £2, 10s. 2d., and in 1670 it was 17s. per qr. In 1680, with slight fluctuations in value, it made the even money of £1, 10s. 9d. In 1690, it receded to £1, 10s. 9d. At the beginning of the next century it stood at £1, 15s. 6d. Ten years after, the value

had risen to £3, 9s. 4d., sank again to £1, 12s. 10d.; in 1730 it was 5d. lower still, but in 1740 it had risen to £2, 5s. 1d. The next decade saw it fall to £1, 8s. 10d., but at the end of the succeeding ten years it had advanced 3s. 7d. per qr. In 1770, it had reached £2, 3s. 6d.; in 1780, fell to £1, 16s. 9d.; in 1790, recovered its buoyancy up to £2, 14s. 9d. per qr.

The occurrence of the French Revolution and the advent of Napoleonic rule, as we have already indicated, gave in the succeeding ten years a great impetus to, or, at all events, it caused prices to rise immensely. As the averages of the price of wheat during the present century must be interesting to all our readers, we give them year by year from 1800:—

1800.....	£5 10 5	1835.....	£1 9 8
1801.....	5 15 11	1836.....	2 19 4
1802.....	3 7 9	1837.....	2 15 10
1803.....	2 17 1	1838.....	3 4 4
1804.....	3 0 5	1839.....	3 10 6
1805.....	4 7 1	1840.....	3 6 4
1806.....	3 16 9	1841.....	3 4 5
1807.....	3 13 1	1842.....	2 17 5
1808.....	3 18 11	1843.....	2 10 2
1809.....	4 14 5	1844.....	2 11 3
1810.....	5 3 3	1845.....	2 10 9
1811.....	4 12 5	1846.....	2 14 9
1812.....	6 2 8	1847.....	3 9 5
1813.....	5 6 6	1848.....	2 10 6
1814.....	3 12 1	1849.....	2 4 6
1815.....	3 3 8	1850.....	2 0 4
1816.....	3 16 2	1851.....	1 18 7
1817.....	4 14 0	1852.....	2 1 0
1818.....	4 3 8	1853.....	2 13 0
1819.....	3 12 3	1854.....	3 12 7
1820.....	3 7 11	1855.....	3 14 9
1821.....	2 16 2	1856.....	3 9 2
1822.....	2 4 7	1857.....	2 16 5
1823.....	2 13 5	1858.....	2 4 4
1824.....	3 4 0	1859.....	2 3 9
1825.....	3 8 7	1860.....	2 13 1
1826.....	2 18 9	1861.....	2 15 6
1827.....	2 16 9	1862.....	2 15 5
1828.....	3 0 5	1863.....	2 4 9
1829.....	3 6 3	1864.....	2 0 4
1830.....	3 4 3	1865.....	2 1 10
1831.....	3 6 4	1866.....	2 9 11
1832.....	2 18 8	1867.....	3 4 3
1833.....	2 13 1	1868.....	3 3 0
1834.....	2 6 2	1869.....	2

CROPPING.*

BY MR MORGAN OF LLWYN.

I PROPOSE limiting my remarks to the growth and respective values of cereal and green crops, which are generally grown in this country. I shall also adopt as the basis of my remarks the four-course system, which is in my opinion (for at least a certain number of years) the most economical and efficient system of cropping. I say "for a certain number of years," for my own experience has satisfied me that after about twelve years' cultivation under that system, it will be necessary to give such land rest by laying it down in grass. I will suppose myself entering upon a farm (which has already been treated on the four-course system) at Michaelmas, and will consider what I had best grow in the "clover lea." I have no hesitation in saying, that if I purpose growing wheat at all, I would plough it up and set the old red Lammas wheat in it, taking care that it should be in the middle of October, as I am pretty sure that, taking the average of seasons for the last fifteen years, moderately early sown crops have been by far the best. If the clover crop had been a good average, and had been grazed on the land perhaps the field would require no autumn dressing with manure; but if in the spring you find your crop does not look as thick and luxuriant as you could wish, I should strongly recommend a top-dressing of nitrate of soda. It has been tried with excellent results by some of the best farmers in our neighbourhood. I think the best time for the top-dressing is about the middle of March, which having been attended to, I think we must then let it take its chance, with the exception of a rolling or two, and a run through it, to take care of the weeds.

I must here remark that in nine cases out of ten the wheat is permitted to become sadly over-ripe before it is reaped. The effect is seen not only in the shrivelled, crimped appearance of the grain, and in the scant yield of flour, but common sense and scientific testimony point to an enormous deterioration in the value of the straw. Now, gentlemen, I have intimated a doubt as to the wisdom of growing wheat at all in this neighbourhood, but especially in the upper part of the county. Having fairly given

the matter my best consideration, I have arrived at the conclusion that an oat crop on clover lea is the more remunerative of the two. Thus I take the average amount of wheat grown per acre upon land of 20s. rental to be 25 bushels, which, at 6s. 5¼d. per bushel—the average for the last seven years—will make £8, 0s. 11¼d. per acre. Now let us see what oats, set on the same land, and under similar circumstances, will make. We can safely calculate upon a yield of 50 bushels per acre, which, taking the seven years' average at 2s. 11d., will make £7, 5s. 10d. per acre. But in favour of the oat crop you have four whole months' grazing of the land, which cannot be put at less than 5s. per acre; then the difference in the cost of seed will amount to 7s. 3¼d., leaving an apparent balance in favour of the wheat crop of 2s. 5¼d. per acre. If these figures are correct, I would ask you, which would you prefer, a field of wheat or a field of oats, when you take into consideration the extra risk which attends the harvesting of wheat? We have not hitherto spoken of the relative value to the farmer of wheat and oat straw. And here I shall most likely run counter to the opinions of many, if not all the gentlemen present, for I am going to claim a decided superiority for the oat straw. I was born and bred in the possession of quite a different idea; nor should I have been convinced now were it not for the observations and arguments of a very intelligent neighbour of mine, backed up as he was by an analysis made by Professor Voelcker. Oat straw heads the list for all flesh and fat-forming properties. Barley straw comes next, and wheat straw, which is the highest priced in the market, is the least valuable of all. Such being the result, I think I am justified in submitting it to you for discussion. I should add, that in my opinion the weight of straw per acre would be in favour of the oats, while no one can doubt which is the more hardy and most to be relied on, taking the average of soils.

We must now proceed to treat the land preparatory to the next crop, and I shall practically confine myself to the Swedes and mangolds as being the most valuable roots grown for the maintenance of stock. As soon, then, as the pigs, poultry, &c., have picked up what ears and corn may have remained after hauling, I send in

* Donegal Road before the Carmarthen Farmers' Club.

the scarifier with the broad spuds (or tines) on, and scarify it thoroughly 2 or 2½ inches deep, and, if necessary, to secure a thorough paring, I would recommend a cross-scarifying — then harrow it with a light harrow, say once a-week till the middle of October—by that time the grass, roots, weeds, and stubble, will have been reduced into a compost of considerable manurial value. I then spread over it what I consider to be a half-coating of farm-yard manure, plough it in as soon as possible, not deeper than about 4 inches. I then shut up the field, leaving it to the mercy of wind, rain, frost, and snow, until the beginning of April, when you will find it reduced to a powder. This time plough as deep as you can, harrow it well, then send the cultivator through it, repeat the harrowing, and, unless the land is very stubborn, you will find it fit and ready to be cobbed into ridges. Previous, however, to the ridging process, we must remember that it has had only half the allowance of manure; I, therefore, to act honestly by the land (for there is nothing that will carry tales sooner), purpose giving the other half now in the shape of artificial manure. I have found 2 cwt. of superphosphate and 1 cwt. of guano per acre sufficient to produce an excellent crop of mangolds and Swedes.

Mangolds should always be set before the end of April. I only set as much as is necessary to keep my cattle on from the time that the Swedes are done—*i.e.*, about the latter end of March—until they are turned out to grass. I have found them of very great use for young calves, which I have sometimes housed during the summer months; but there can be no doubt that, in such cases, vetches or cut clover are as good as, and more economical than, mangolds and hay. I have frequently kept them in good order till July, and on one occasion I had some quite healthy in the early part of August. Still, I only grow them sparingly, as I have not grown anything like such a weight per acre of mangolds as of Swedes. I should like Swedes to be set during the first fortnight in May. I last year set a considerable portion in the last week in April, and a better crop I have never seen. In favour of early setting there is the obvious advantage that then the land is more moist, and better calculated to make the seed vegetate than under the broiling sun of June, when the land, after repeated ploughings and harrowings, is as dry as a bone, and so long as the drought lasts the seed might as well, or perhaps better, have been in the seedsman's warehouse. I am well aware that some object to such early sowing of Swedes, on the

ground of their being the more liable to mildew, I can only say that I have not found that to be the case, and have sometimes suspected that the objection has been made merely to cover the farmer's remissness in not setting his crop in good time. I like the ridges raised about 27 inches apart, for then you will be able freely to send between them the horse-hoe, that most important implement in the successful cultivation of green crops. Whatever sins are pardonable in the farmer I can admit no excuse for the man who, having incurred very great labour and expense in setting a field of turnips, permits the plants to be choked and the land overrun by foul and poisonous weeds. A light roller sent over the ridges prepares the way for the drill, which should have its coulter so as to form a groove for the seed to fall into. There should be no rolling after the seed is put in; for unless the land is perfectly dry it compresses the earth, which, when dried, becomes a hard crust, through which it is useless to expect the young plant to force its way. If we have a plentiful supply of plants I would, as soon as they have got into the rough leaf, send the hand-hoes through them, striking off the unnecessary plants, and only leaving small bunches of four or six at the distances at which you intend growing your permanent crop, and until the plant that is to remain can well dispense with the other's company, which will be when it is about 2 inches above the ground. I like to see Swedes thinned about 10 inches apart, much preferring two moderate sized to one very large turnip. They are generally firmer and keep better. I store my Swedes about the end of November, being satisfied that if sown at the time I suggested, they will have reached their full maturity. I have them topped and tailed in the field, charging the men not to cut the leaves too close, for by so doing a considerable quantity of winter food is lost, and the tubers have not so good a chance of standing the frost. I then tilt them about 3 or 4 feet high, by as many feet wide, against the high bank of a hedge, running nearly north and south, which, with the assistance of a good covering of refuse of straw, the plasterings of hedges, and such stuff, effectually protects them from frost. I have adopted this simple plan for years, and have found them keep perfectly sound and healthy to the end of March. Mangolds require much greater care. I store mine in a house built for the purpose, placing between the mangolds, at thicknesses of about 2 feet, layers of small branches, which act as ventilators, and prevent fermentation setting in. I should remark that mai

require to be thinned at greater distances than Swedes ; I should say about 14 inches, and when drawn, the tops should on no account be cut close ; for once the crown is cut, the keeping properties of the mangolds are materially injured.

Now, for our last white crop, 'I would, as a rule, recommend my favourite—oats ; because it is more hardy, and better adapted to the generality of soils than wheat or barley. Still, if you have a field suitable for the growth of barley, it is a crop with which the farmer can hardly dispense. Its feeding properties and its superiority over even oats in many respects are too well known to require enumerating. But it is only when that oppressive and unjust impost, the Malt-tax, shall have been repealed that the full value of barley to the farmer will be realized. It only remains for me to advise you to sow, with the barley or oats, the very best clover grass seeds you can get, although, after the important disclosures as to the enormous adulteration of seeds at our last meeting, the warning may hardly be necessary.

DISCUSSION.

Mr JONES, Penycod, said :—It would be just to say that the consideration of the system of cropping would be putting the cart before the horse, unless they considered how to put the land in proper order for sowing seed. Any farmer, before he adopted a system of sowing or cropping, would first ascertain the qualities of the land he was about to plough. Personally, he was not an advocate for ploughing old land before it had been manured. Farm-yard manure, if it could be got, was very good. Lime and earth he often thought good. As to the four-course system, he had tried it many years ago, and followed it for seven years. During the first round he found it answer very well, but when he came to the second he found the land too light to bear a heavy crop. That crop was generally wheat. When the land had been one year in grass he put in wheat, which looked very well indeed until it came to the ear, when he found the stem withering at the root, the land being too light to hold it. It was then he discovered that the four-course system would not do. He would tell them what he had been doing since. He afterwards followed the six-course system. First, he had two years in grass, then he put in wheat, then he limed it as well as he could after the turnips, and then had a crop of barley or oats, according to the nature of the soil. Then he had turnips, and then barley or oats again, according to the seed, then two years in grass. He had found that system to answer well, and he was still pursuing it.

Mr BRODIE, Tyrdail, said it appeared to him that there was no general rule that could be laid down for the different climates, the quality of the soil, and the different crops, so much that a general rule was

rendered impossible. For example, look at the rainfall in South Wales. There was one thing which appeared to him certain, viz., that no two crops of any sort should succeed each other. He did not think that was properly acted up to in Wales, and the day seemed to have gone by for having any stringent conditions in leases. He fancied now that if a farmer had got anything in his head, or anything in his pocket, he should never suffer himself to be bound too tightly by a lease. He should go with the times and his own inclination. Of the four-course system he did not approve. He never adopted it himself except upon one small farm, and that had a clay soil. It went on well for a time, but it told upon the land eventually. The land required, after some of the crops, a good deal of getting up again, as it was exhausted. Mr Morgan had spoken very much in favour of nitrate of soda. He could not himself say that he had found it very satisfactory. It might do for a hay crop, but nothing else. It was like a man who wanted to get a good bit of work out of himself, and so took a few glasses of beer ; but on the next morning he would be found very seedy. If they would only notice the land after nitrate of soda had been used, they would find it was not a very profitable thing for the farmer. He might be wrong on the point, but anyhow such was his experience. He did not exactly comprehend what Mr Morgan meant in his reference to the Malt-tax. He did not think that the Malt-tax had anything to do with cropping.

Mr MORGAN : It has to do with barley.

Mr BRODIE agreed that if the duty were taken off a corresponding help would undoubtedly follow in favour of the foreigner. He did not see what the country could gain by beer being reduced in price.

Mr LEWIS, Llwynfedwen, said that he thought it would have been more practical if Mr Morgan had attempted to shew what system of cropping was best for Carmarthenshire. But, on the contrary, Mr Morgan had never alluded to any system of cropping ; he had been talking only of the rotation of cropping. His own opinion was, that when land was worth 25s. per acre, it would not answer for any rotation of cropping. It would be better then to keep it in permanent grass. Besides, there was very little land in Carmarthenshire that would produce wheat to the extent Mr Morgan had mentioned, viz., 25 bushels per acre. On the average, he did not think the best land would produce that quantity. He could speak from experience, because he occupied some very good land himself. He had inferior land, of which it would be nearer the mark to say that it produced the half of 25 bushels per acre. And as to the comparative value of oat straw and wheat straw he ventured to say that wheat straw was the more valuable. It afforded more nourishment to the cattle.

Mr HARRIS, Abersannan, contended that in discussing the question of cropping they must ascertain what mode would best help them to pay their rates and taxes. As to the four-course system, he believed it was quite practicable if they had a summer fallow.

MR MECHI ON THIN SOWING.

WE have been favoured by Mr Mechi with the following communication:—

"The more frequently I discuss this matter with practical farmers in various counties, the more convinced am I that their opinions of proper quantities are not based upon, or deduced from, comparative and experimental trials; but that they too often merely follow the practice of their fathers or grandfathers, and the general custom of the neighbourhood. In consequence of this want of comparative experiments on a small scale (say half an acre in each field), there is not only a great waste of seed, but a far greater loss by diminution of the crop. In my case, on heavy land, the difference was fully 30s. per acre in favour of one bushel of wheat over two per acre. I should never have known this, had I not found it by comparative experimental quantities in each field. It does not answer to take old practices for granted under an altered state of circumstances. Under the old broadcast system, and the absence of dressing and blowing machines, it was necessary to allow much for uncertain planting, inferior seed, and waste by birds, &c. It is a great mistake to suppose that land can, in our climate, be too rich for cereals, for these are the crops that exhaust our soils, being all disposed of. It is the too thick sowing that created this erroneous opinion. Farmers often say to me, "I dare not give my animals cake with the turnip crop, for my barley gets laid prematurely, and destroys the young clover." In such a case I recommend a reduction from 3 or 4 bushels to 6 pecks, or on very rich soil, to 1 bushel. This last year I grew 7 qrs. per acre of barley from 6 pecks of seed, after a white wheat crop of 6 qrs. per acre. A portion was sown with only 1 bushel per acre, and it appeared as good as, or even better than, the 6 pecks. For many years my wheat crop has been grown from 1 bushel of seed per acre, and has occasionally a small area

produced large crops from only 1 and 2 pecks. Many farmers who have adopted Mr Hallett's advice, and sown small quantities of seed, have reaped much heavier crops than usual. In fact, the practice of thinner seeding is at length making considerable, but by no means sufficient progress. Thick sowing, with high farming, produces a dense mass of vegetation, obstructing the passage of light and air and preventing that branching or tillering which is the natural habit of cereals. So eager are plants for light that, being thus deprived of it horizontally, they rush up vertically, become weak-legged, and tumble down prematurely. The robust wide-spreading wheat plant, with its broad flag and bold full ear, is crowded and cramped into a thin and weak stem, with puny ear, and few small kernels. The stem, where it issues from the crown, is soft and spongy, instead of hard and glossy. This desire of plants for light is apparent under many circumstances. The window of a darkened room attracts alike the potato shoot or the flower stem. Two trees in close proximity only make branches towards the light, turning their backs to each other. Unthinned plantations produce only branchless bare poles. To exclude light from a cereal plant is as unprofitable as to do so with an unthinned turnip crop. In the latter case, the necessity for thin plants is never doubted by any agriculturist. There is something absurdly convincing in the wretchedly small increase of our cereal crops. Ten kernels for one, or a quarter of an ear (which is estimated as the average of the United Kingdom), appears like an impossibility, but it proves, unmistakably, that a ruinous competition for air, light, and food, takes place among the overcrowded plants, and must destroy many of them. Comparative experiments on a small scale would save the farmer's money in a variety of ways, and is, therefore, highly desirable.

"P.S.—I drill two bushels of oats per acre."

TREATMENT OF LAMBS BEFORE AND AFTER WEANING.

THIS was the title of a paper recently read before the Yorkshire Agricultural Association, by Mr E. Riley, of Kipling Cote Farm, and its publication at the present time, seeing that the season has been so backward, will not be considered inopportune. Of course it will be understood that Mr Riley was speaking of mixed farms, and apparently of those where stock husbandry predominated :—

A large amount of the capital of the farmer is absorbed by his cattle and sheep. The return on his live stock will be, as a rule, in proportion to the skill brought to bear on its management. When diseases assail his animals the veterinary can be called in; but in relation to their daily treatment, and the keeping of them in ordinary health, he should be able to rely on himself. To have some acquaintance with nutrition, and of the intimate connexion between the condition of his stock and the several kinds of food thereby consumed, cannot but materially assist him in his daily tasks, and save him from a multitude of errors.

Young stock require different treatment to fattening stock. The great object, then, in rearing them is to obtain a proper development of all the organs of the body, and this can only be done by giving them suitable food. A study of the nature of the food of animals will enable us to supply all that the animal requires. As we know the analysis of all foods, we may judge of the nutritive value; still, for practical purposes, that value must be corroborated by actual feeding experiments; for it is quite possible that one article of food may contain more flesh-forming material than another, and still not to be so nutritive, on account of indigestibility, and the way it is given. We often see dry unbruised corn pass from horses, and a large amount of nutritive matter is thus wasted. The same food given in a bruised state is rendered more digestible, and consequently more nutritive. As it is indispensable for the food of a young animal, it is not surprising that the increase of the growing frame, and the constitution of all animals is improved by being well kept when young, that is, kept in a progressing state and as the milk of the mother is known to contain all the substances necessary to support

life, we should give them food that approaches to it as near as possible. Sheep's milk is thickish, and of an agreeable odour and taste. Its solid constituents amount to 14.38 per cent., and of these are four of caseine, four of butter, and one of salts. As we know the different constituents of milk and of all foods, it is not difficult to compound a mixture suitable for lambs after weaning. It is obvious that by a due mixture of articles of food we have a compound analogous to that of milk. We thus see not only the advantage, but the necessity of a mixed food for the healthy sustenance of the animal body.

I have before me a sample of mixed food, the analysis of which nearly approaches to that of milk; it contains about 1-12th of malt and a small proportion of common salt, both indispensable for young stock. Salt I believe to be a valuable addition to the food of all animals; the extensive experiments of Boussingault have fully proved this. Dr Le Saine, of Brussels, in his prize essay on the use of salt, says :—"Salt increases the fertility of the male, and the tendency of the female to conceive, and doubles the power of nourishing the fœtus. During the period of suckling, the salt given to the mother renders the sucking animal stronger, and the milk more abundant and more nutritious. Salt accelerates growth, and renders the wool of sheep finer." Warden says—"In the northern districts of Brazil, domestic animals died when they did not receive a fixed portion of salt." A great deal depends on the treatment the ewes receive after tupping; until the lamb quickens they can be run off at a very light expense, then it is highly necessary to keep them well. I would advise not to let them follow other sheep, as I believe the quantity of silty and indigestible food they there get is one great cause of casting their lambs; but let them have turnips to themselves, with plenty of dry food, as hay or cut oat sheaves. About three weeks before lambing they should have a little of some more generous food, and a few mangolds. They will well repay the extra food in wool and plenty of nutritious milk; and remember every lamb you lose is a loss of £1 and very often as many lambs are lost for want of proper nourishment, as would pay for all the extra food given. I believe the

; to be an excellent food for ewes, and give 200 for the season, and the double till weaned :—1½ ton of linseed cake, of oats, 1 ton of beans, 1 ton of locust al, 1 ton of malt coombs, 1 quarter of d 1½ cwt. of common salt. I can read it, as it is what I used this season, and lose a single ewe.

difference of opinion exists as to the time of weaning lambs. We must all be of different circumstances. Their treatment after weaning is one of the most important branches of the management of sheep. If they are not properly cared for at this critical period they will be wrong, and then the loss is generally great. A month before weaning, it is good to teach the lamb to eat some easy and nutritious food. The sample before is an excellent mixture; some may think it too expensive; with the duty on malt it will be prepared under £12 per ton. I believe that the corn cake and linseed cake,

mixed in the proportion of two parts of the former to one of linseed, excellent food for lambs. I have seen them do remarkably well upon it. It is not the giving them a large quantity so much as beginning with a little early, say a quarter of a pound each per day. When weaned, I think it is a good plan to leave the lambs in the pasture they are in for a few days, giving them plenty of green tares; they remain more quiet than when removed to a strange field, do not fret so much, but disperse themselves over the pasture. They can afterwards be put to keep, which has not been eaten with sheep, or green tares, as is now a general practice on the Wolds. I am quite aware in some situations farmers have no difficulties to contend against when weaning their lambs. On most Wold farms, however, we find it a serious matter to keep them in a progressive state, though I believe it is more mismanagement than what we generally term "back luck" when we have had such heavy losses among them.

BREEDING AND REARING OF HORSES.

BY MR J. D. BADHAM.

AS regards horses for riding, we constantly hear the remark, "Breeding nags does not pay." Why does it not pay? Simply because we breed amiss. Do we not put mares without any known pedigree, and too often with some hereditary defect, to any stallion which happens to come near us? Certainties in horse breeding are fallacious, yet we must be guided by general rules, and the breeder who carefully studies the selection of both sire and dam will far outstep the reckless breeders. Our great object should be to produce an animal as near perfection as possible; for this end, the sire chosen should be possessed of those points in which the dam may be deficient. There is, in my opinion, but one true shape for a horse, whether it be a cart horse or a hunter, and depend upon it the sloping shoulder is as necessary for the one as the other; for if he has a straight shoulder he cannot walk, and the old story about being able to draw with a sloping one is sheer nonsense.

HOW TO BREED A GOOD HUNTER.

You must, if you wish to succeed, give up using the half-bred horses, except upon thoroughbred mares; if you have the alloy in the dam you do not want it in the sire. The modern hunter or hack must be thoroughbred on one side; and I should like to see the same rule in our Agricultural Society in Suffolk as they have in the north, where no animal is allowed to compete unless the pedigree shew at least two crosses of blood. The great improver of his species is the thoroughbred horse, and if we wish to succeed in breeding a modern hunter or hack, we must select a mare free from hereditary ailments, and put her to a horse with plenty of stout blood in his veins. In the best hunting counties, such as Wiltshire, Northamptonshire, and many others, the cocktail stallion is unknown, and more

than one of these counties the only good mare, the only good sire, the only good blood, is the thoroughbred. It is of extraordinary importance to select the best of excellence

could be traced in some way to the dam. At the same time we must not overlook the importance of good sires, for without these we shall assuredly fail in our attempts to breed a good animal. How does the chance breeder proceed in the choice of his sire? Does he look for one which has all the points good in which his mare is defective? If he did, half the evils might be avoided; but chance is again trusted to, and all the anxiety he evinces in the matter is the cost of the horse's services; while in other cases it is the one which passes the gate, or is close at hand, which is chosen. He may have every defect to which horse-flesh is liable, but this is no matter to the chance breeder; a foal is all he wants, and I once heard a breeder say, "A foal was a foal, and it could not be a calf." He never pictures to himself the cost of rearing a colt up to three, four, or five years old, and then finding the animal has a spavin, a curb, or a ringbone. The systematic breeder never allows any chance-work to creep into his concerns. Whether he breeds racers, hunters, carriage, saddle, or cart horses, he selects with deep anxiety the animals he intends to breed from, of both sexes, and those which he can trace back to blood of unquestionable family in their class. Breeders of this description are not numerous in these counties, but there is nothing to prevent their becoming so, and they will generally succeed best by confining themselves to breeding only one class of horse, though of course there are exceptions to this as every other rule. One, I remember, some years ago in the eastern parts of this county; I remarked that all his colt foals were sent away as sires, and his fillies became first-class mares, and were always winners at the Suffolk Agricultural Shows, and before he let his home farm, he offered to shew his five mares with any five in the county; the challenge was accepted by the late Mr Cattlin, who was beaten by him. The same gentleman bred also hunters and hacks, and in these he was just as successful; his carriage horses were bred by himself, and they had not their equal in the county, and one of his hacks I shall always remember. I mention those facts to shew it is not so difficult as people fancy to breed good animals if you only set about it in the right way, for

is like." Temper, power, endurance, rally follow the dam; form, action, &c. Without losing sight of the power, breeding a hunter can have the better, often called on to perform extra-ordinary gameness, and from the thoroughness all the pluck and courage to stay aided by their blood-like action to give a comfortable seat in their saddles. Necessary for a mare to have been a mer herself, but there are a few points, viz., a sloping shoulder, deeper cannon bones, a good back, big hind thighs, and hocks, with her hind proper position under her. As I have temper, spirit, and endurance are all ideal in the dam. Mares to breed mares need not be so well bred as those hunters, but they must have plenty of, with good heads, necks, and hind should be put to a thorough-bred stallion to breed first-class animals. The applies to hacks, and it is utterly improved a modern hack except in this

NATURAL HORSES—IMPORTANCE OF PEDIGREE.

Is horses for agricultural purposes, which will interest you more, as a body of practical farmers, than what we stitute a good draught brood mare, nothing connected with agriculture importance to the farmer than his, with the exception of manual labour. At steam is largely employed where horse-power was used, both in cultivating; but horse-power still is, and is, the principal means by which a through his work, and steam becomes of an auxiliary than a *real* power. In the case, is it not our interest to have power of the most approved class? For to effect this the same attention to both sire and dam as in breeding in the field or road. A pedigree of unthoroughness is absolutely necessary; if horses with all that you want in a pedigree, or only an imperfect other with some faults, but with select the latter, as you are more at an average foal, but with the other vice; you may get what you want, or not. The all important point of soundness to be considered. It is the essential road mare for all purposes. It is a fact that there are certain diseases to

which parents are the subjects, and which will descend in the progeny. Ringbones and sidebones are hereditary in almost any form. Indeed ringbones will come out after many generations; blindness, a special disease of horses, is certain to follow breeds, and on no account would I recommend breeding from either sex affected with it. A mare may lose an eye or become blind from accident; but though this would not be hereditary, it unfits her for that office for which nature has destined her—to protect and shield her offspring from injury, besides it makes her clumsy, and she is liable to tread on the foal. Diseases of the respiratory organs, as roaring, whistling, broken wind, and thick wind, are all, I consider, hereditary diseases. Diseases in the feet should be carefully avoided. Sand crack I have seen follow in families, and seedy toe also. In conclusion, I may add, that it is most important to have both sire and dam in a healthy condition, as the progeny of sickly-framed animals are sure to inherit some of their failings. Perfect conformation and soundness in both sire and dam are of the greatest importance. Before I conclude I will make a few remarks upon the treatment of foals, and yearlings, &c. Having bred a good animal, the next thing we have to attend to is his being well cared for. I will suppose you are breeding animals of the right sort, and such as will bear a little increased expenditure to be bestowed upon them. I will begin with the foal: get them early as possible, and give the dam bran, corn, and hay. Corn should be continued a good part of the summer, if you intend having a good yearling, and three feeds should be given to the foal daily, when it is weaned; during the following summer, and, indeed, till the animal is rising three years old, no corn will be necessary, but at that age it should be brought into the stable and commence its education; this course requires good management; but I would on no account allow it to be taken off the farm to be what is termed broken; if you must employ a person for the purpose of getting the animal in a fit state to be ridden, by all means have it done at home. And I strongly advise all breeders to have their foals haltered and tied now and then, when they are sucking upon the mares. The greatest care is necessary with stock of this description. It is quite possible to avoid accidents in a great measure—at all events, we should try to avoid them; allow only a very careful man, who uses your animals gently, to have anything to do with them, and I feel sure you will find accidents much less common than heretofore.

A MODEL FARMING VILLAGE.

TO the "Far West" we are indebted for many attempts to cultivate the land and arrange communities in what may be called a paradisiacal fashion. But these attempts have not been altogether successful. Nathaniel Hawthorne tried it, but rather tired of it. Others did the same. Laurence Oliphant also sacrificed a splendid position for the realization of a similar idea, and he, so far, we understand, is not perfectly satisfied with it. The latest prospectus we have seen for establishing a rural commune upon commercial, moral, and religious grounds, comes to us from the New York Farmers' Club. It was got up in this way: Mr John Edwards of Wisconsin, who is a bachelor of forty, who has been a farmer for many years, knows French, Latin, and Greek, has several thousands of "almighty dollars" in Government bonds, is not satisfied with his present position, and he asks the Club what he should do, seeing that he likes farming and desires to go west. The Commander of the Club—they are not Presidents in America—advises him to join Mr Meeker in his colonization scheme, which is thus defined:—

I propose to unite with proper persons in the establishment of a colony in Colorado Territory.

A location which I have seen is well watered with streams and springs, there are beautiful pine groves, the soil is rich, the climate is healthful, grass will keep stock the year round, coal and stone are plentiful, and a well-travelled road runs through the property. The land is either subject to entry under the Homestead law, or it has not yet been brought into market, but it can be settled upon without other cost than 18 dols. or 160 acres. In addition, the Rocky Mountain scenery is the grandest and the most enchanting in America. I have never seen a place which presents so many advantages and opportunities.

The persons with whom I would be willing to associate must be temperance men, and ambitious to establish good society, and among as many as fifty, ten should have as much as 10,000 dols. each, or twenty 5000 dols. each, while others may have 200 to 500 dols. and upwards. For many to go so far—but means, can only result in disaster. After a few people can be received and have a chance.

My own plan would be to make the settlement almost wholly in a village, and to divide the land into lots of 10 acres, and to divide these into eight lots for building purposes, and then to apportion to each family from 40 to 80, even 160 acres adjoining the village. Northampton, Massachusetts, and several other New England towns and villages were settled in this manner, but some improvements are suggested. Since some outlying tracks will be more desirable than others, a preference may be secured by selling them at auction, and the proceeds of such appropriated to the use of the colony; and all the lots of the village should be sold, that funds may be obtained for making improvements for the common good—such as the building of a church, a town hall, a school-house, and for the establishment of a library, by which means the lots will be worth five or ten times more than they cost; and one of the very first public institutions should be a first-class school, in which not only the common but the higher branches should be taught, including music. The town of Lincoln, the capital of Nebraska, adopted this plan on a large scale, and several hundred thousand dollars have already been obtained.

Some of the advantages of settling in a village will be: easy access to schools, and to public places, meetings, lectures, and the like, and society can be had at once. In planting, in fruit growing, and in improving homes generally, the skill and experience of a few will be common to all, and much greater progress can be made than where each lives isolated. It seems to me that a laundry and bakery could be established, and the washing and baking could be done for all the community; but other household work should be done by the families. In all this, the separate household, and the ownership of property, should be without change; and I only propose that, if there are any advantages in co-operation, they could be secured by a colony. Cheap rates of passage and freight could be secured, while many things, which all will want in the commencement, can be bought wholesale.

Farmers will be wanted, nurserymen, florists, and almost all kinds of mechanics, as well as capitalists, to use the coal and water-power in running machinery. Inasmuch as millions of acres of excellent grass are in the vicinity, and which for years will lie open, stock can be kept by each family, and at a small expense it can be cared for by herdsmen employed by the people. The profit of stock growing can be considered certain, for the locality is not as far from the Missouri River as Texas, whence immense numbers of cattle are driven. Besides, railroads are nearly completed, and a railroad is almost certain to pass through the land I refer to. The establishment of a colony would hasten the day.

ony shall be organized, it will be pro-
a committee of good men to visit the
x on the location, for there are other
choice is to be made.

ttlers must of course be pioneers; for
and mechanic shops are to be built,
may come with few privations, and as
nths will be required.

rofessions and occupations enter into the
n intelligent, educated, and thrifty com-
d be embraced by this colony; and it
: object to exhibit all that is best in
ation.

r, should moral and religious sentiments
ithout these qualities man is nothing.
me tolerance and liberality should also
thing more is equally important. Hap-
, and the glory of a State spring from
d it should be an aim and a high ambi-
e the family pure in all its relations, and
the best efforts life and strength can
the home comfortable, to beautify and
id to supply it with whatever will make
rd loved.

ie vicinity of the mining region, which
be developed more and more for years
, besides silver and gold, there are all
metals; and the market for every kind
uct is as good as New York—perhaps
a decidedly healthful region; the air is
ure, summer is pleasant, the winter is
le snow, and agues are unknown. Al-
ptives are going thither for their health,

and tourists and visitors will find great attractions
during the summer. Mineral springs are near, and
perhaps on the locality I have referred to. Deer,
antelope, wild turkeys, prairie chickens, and speckled
trout abound; but at present there are too many
wolves and bears.

I make the point that two important objects will be
gained by such a colony. First, schools, refined so-
ciety, and all the advantages of an old country will be
secured in a few years; while, on the contrary, where
settlements are made by the old method, people are
obliged to wait twenty, forty, and more years; second,
with free homesteads as a basis, with the sale of re-
served lots for the general good, the greatly increase
d value of real estate will be for the benefit of all the
people, not for schemers and speculators. In the suc-
cess of this colony a model will be presented for sett-
ing the remainder of the vast territory of our country.

We confess that we should have thought
more of this glowing picture, and the after
prospects of pleasure and profit in connexion
with it, had its geographical whereabouts been
more clearly specified. The vagueness about
the *locale* has rather a tendency to raise the
suspicion that the plan is that of an accom-
plished speculator, with ends less disinterested
than they are made to appear on paper, more
concentrated, in fact, than communistic. "But
further on," as the old proverb has it, "we
may hear surer word."

Our Library Table.

Alpine Flowers for English Gardens. By William Robinson, F.L.S. London: John Murray.

THIS book was written, as our author observes, to dispel a very general error prevailing, that the charming flowers of alpine countries cannot be grown satisfactorily in this country. If the object so much desired by many were determined by the lessons inculcated, and the manner and mode of conveying and illustrating them in the book under review, then we should have little hesitation in looking upon the thing as *un fait accompli*. What will render the book popular—popular, we mean, out of the sphere of those who admire flowers in general, and of those who are wedded to the beauty and interest of alpine flowers in particular—is the great regard manifested throughout the work for calling plants by popular names. Many persons would have little difficulty in remembering “Creeping Jenny,” and “Welsh Poppy,” when they would scarcely attempt to articulate *Lysimachia Nummularia* and *Meconopsis cambrica*. Of course there is no harm in being well up in both scientific and popular nomenclature, and that, too, is well observed throughout; but if we are to recruit the list of those who wish to know and distinguish plants by some name or another, we must offer some easier course of attaining the end than laying before the senses precise botanical nomenclature.

Part I. is devoted to the culture of alpine flowers. Rock-work in various forms is recommended as the best medium for cultivating these plants to the highest degree of perfection. But the rock-garden, as we often see it, is considered totally unsuitable for many choice plants, little regard being shewn to the wants and habits of many gems that, consequently, never in this country develop their beauteous inflorescence but as if labouring under difficulties. The Alpine Catchfly, and the German Catchfly, and the Cushion Pink end forth their roots into deep and long fissures of rock in their native haunts, and are therefore comparatively secure from the infliction of a period of drought; serving to shew the necessity for careful imitation in our artificial rockeries. Illustrations among in the matter of construction of these rock-works, and the anxious to judge for the book. The book is illustrated with numerous small woodcuts, showing the various forms of rock-work, and the various garden shrubbery; and sets of plants as have been found suitable, are recommended. A very original idea is illustrated of fur-

nishing old ruins and walls with plants that are remarkable either for flowers or for furnishing suitable drapery. Alpine succulents, such as sedums, sempervivums, and echeverias, are descanted upon, and various methods are shewn by which a portion of a flower garden may be enhanced by what might be called an æsthetic arrangement of sorts and sizes. The whole subject, indeed, is detailed, so that the veriest tyro may understand, from the raising of his alpine plants from seed to their position and culture upon a proper groundwork.

What gives the instructions an additional tone is the author's personal experience of a considerable portion of the alpine places, where many of the most beautiful of the tribe are to be found. His pen and pencil have not been slow nor ineffective in portraying the various groups that came under his own personal survey. In truth, the description of the “little tour,” is one of the most interesting and instructive chapters in the book, which we read and conned over without intermittence, and with great interest. The ascent of the Grand Salève, with many of the spots covered with bright pinks, blue harebells, and various of the pea-flowered tribe, was looked upon as gay as the air was full of the voices of innumerable insects, and must have contrasted somewhat happily in comparison to the fatigues of hunger, cold, and wet, to which our author had to submit ere he reached the much-longed for Saas. In crossing the pass of Monte More into Italy, after giving a graphic description of Monte Rosa, and descanting on the Swiss and Italian scenery, he goes on to observe:—

“We had several miles to descend through the snow before a trace of vegetation could be seen, when fairy specimens of the nearly universal *Primula viscosa* began to skew their rosy flowers here and there on ledges, where they were pressed down by the snow; and by clearing little spaces with the alpenstock, we found the ground nearly covered with them. Then the glacial ranunculus began to make its appearance in abundance. Another rare and minute gem was here in quantity—the silvery *Androsace imbricata*, growing on the under side of the rocks—the tufts, not more than half-an-inch high, sending roots far into the narrow chinks. These having a downward direction, the water could reach the roots from above. One plant was gathered under the recess of a deep cliff, with at least one hundred little rosettes and flowers, forming a tuft three inches in diameter, all nourished by one little stem as thick as a small rush, and which was bare for a distance of two or three inches from the margin of the chink from which it issued. The tuft, bloom and minute silvery leaves suspended by this, were in all probability as old as any of the great larches in the valley below.”

one of many samples, of how our author is into the habits of alpine vegetation.

gives a popular description of most of the vers known, or at all events such of them as y of extended cultivation in this country. speaking, this is the only extended descrip- such plants in literature, and, as far as we able to investigate, may be looked upon as worthy. To the thousands of amateurs in l as in the other countries of a similar range ture, it must prove invaluable. We have his month to dwell further upon the details that, in our opinion, is of the utmost im- n all villa and even town-house libraries. tturn to it in a future number. Meantime e following as a sample of how hundreds ine plants are described :—

ANA VERNA (Vernal Gentian).—Very rarely d health in gardens, but known to many as f all that is beautiful in alpine vegetation. he ground with rosettes of small leathery n spreading into tufts from 3 to 5 inches in nd producing flowers in spring that even the lls 'beautiful bright blue,' though botanical usually above taking any notice of colour metimes the blooms barely rise above the l at other times are borne on stems 2 or gh. A few things are essential to its uc- tivation, and far from difficult to secure. ood, deep, sandy loam, on a level spot on perfect drainage, abundance of water during nd dry months, and perfect exposure to the r broken limestone may be advantageously r the soil, but if there be plenty of sand t essential; a few pieces half buried in the he ground will tend to prevent evaporation, he plant till it has taken root and begun to it. It is so dwarf, that if weeds be allowed und they soon injure it. In moist districts : is a good sandy loam it may be grown on dge of a border, carefully surrounded by d stones. It may also be grown in pots of plenty of rough sand, well drained, and beds of coal-ashes or sand, thoroughly the sun, and well watered, from the first March onwards till the moist autumn days i all cases, good, well-rooted specimens cured to begin with, as failure often occurs ectly-rooted, half-dead plants, that would chance of surviving, even if favoured with their native wilds. In a wild state this ndantly distributed over mountain pastures s of Southern and Central Europe, and : latitudes in Asia."

ANA PYRENAICA (Pyrenean Gentian).— like the vernal Gentian in stature and size, bricated narrow and sharp-pointed leaves olet almost stalkless flowers, the flat por-) of the flower being formed of five oval a triangular appendage between each ng as the lobes. It requires much the ent as *G. verna*; flowers in early sum- well worthy of a place in the choice rock- ough not of quite such a vivid hue as *G. G. verna*."

ARUM OBSCURUM (Creeping-rooted H). me, creeping, vetch-like plant, with beau-

tiful large purplish-violet flowers in long spikes, and leaves composed of seven to nine pairs of leaflets, the stipules united and opposite the leaves. From 6 to 12 inches high and sometimes more in rich soil. Readily increased by division or seeds, grows freely in ordinary garden soil on level ground, and is a valuable rock or border plant. A native of the Alps of Dauphiny and the Tyrol. Cultivated in our gardens more than two hundred years ago, but now rarely seen there, though not difficult to obtain."

Les Promenades de Paris—Bois de Boulogne—Bois de Vincennes—Parcs—Squares—Boulevards. Par A. Alphand, Ingenieur en chef au Corps Imperial des Ponts et Chaussees, &c. Paris: J. Rothschild.

FIRST NOTICE.

THERE is no more amiable creature in the world than the typical Frenchman in irreproachable garments, the nattiest of boots, the ugliest of hats, and the lightest of lavender kids. He is charming; but like all charming people, he is apt to have a disagreeable side now and then. This polite being is much addicted to the inconvenient habit of revolutionizing, and that in the ugliest and rudest manner. On the slightest symptom of anything and everything in the stew-political, not being agreeable to the palate of our volatile neighbour, he has (or rather had—of which more anon) an uncomfortable knack of rushing wildly along the narrow streets of Paris, overturning a huge omnibus or two, emptying a house of sofas and tables—in a word, erecting a barricade, and then from behind this convenient shield, proceeding to shout *Vive la Republique!* Then we challenge the world to produce a less amiable individual—an Irish patriot, or a long-shore Bargee not excluded. Sometimes this playfulness on the part of M. Jean Crapaud merely resulted in a number of hot-headed gentlemen being rather prematurely despatched to *le Morgue* (not to hint at an even more objectionable place), and others in due course to find their way to a somewhat unhealthy locality on the coast of French Guyana, named Cayenne. At other times, however, the unwashed rose into power, and a gentleman "of the name of Smith" landed on the hospitable shores of perfidious Albion. The reason of this success was in the fact, that not only were the kings bad, but so were the streets of Paris. Narrow and crooked, barricades could be easily erected, and cavalry could not sweep these narrow lanes of the mob which gradually infected all Paris, until a revolution was *un fait accompli*. Moreover, the broad flags which in many of the streets formed a smooth and cheap, but dangerous pavement, formed convenient material for these barricades, being heaved up at a minute's notice by the brawny arms of the blouses. However, about the year 1852, a change came over the spirit of things in the right royal city of Paris; for just then, one dark December day, out of blood, and slaughter, and diplomacy, a man managed to raise himself over the heads of the seething mass of intriguing politicians into the Imperial throne, on which, from such an un-

promising commencement, he has ever since managed to remain, ruling France better and more wisely than did ever ruler—King, Consul, or Emperor—before him. That man was Napoleon the Third, and Hausman was his Minister. Now, His Imperial Majesty of the House of Bonaparte knew, if he knew anything, this facility of the Parisian for dropping into that fatal game called *la revolution*—and knew it for the best of all possible reasons, he had been engaged in it himself. So laying their heads together, Hausman and his master determined to put barricade erecting to any purpose out of reach of the Parisian, by rebuilding the fair city over again. This was an expensive amusement, but in those days the will of His Majesty was truly imperial, and “hey, presto!” it was done. Only an irresponsible Government could build the pyramids, rear St Petersburg in a swamp, and rebuild the French capital. Before the astonished eyes of the Reds, crooked lanes became spacious terraces, and the narrow entrances of dingy courts broad streets, opening on magnificently-mansioned squares, so that middle-aged gentlemen, like the reader’s humble servant, who had once been students in Paris, and thought they knew it when they again revisited it, soon lost themselves after leaving the familiar haunts of the Quartier Latin, and were glad to drop over to Galignani’s and ask for a new map of Paris. In those days was heard the never-ceasing din of chisel and of mallet. Stone-cutters dreamed dreams, and architects grew jovial over the happy times. There was no god with them but Hausman, and Alphand was his prophet! However, the Parisians, if a very tolerant race, are also a high-spirited one, and Hausman saw that if the terrible pull on the taxpayers’ pocket was to be borne, they must get something better than the outside of fine houses to look at. So simultaneously he laid out beautiful grounds, and parks, and promenades, where *Monsieur le citoyen* might walk or drive with his wife, or child, or sweetheart, where he might sip *café noir* or absinthe, as so to him it seemed good; hear bands play, witness horse races, and altogether enjoy himself. And it was so; and the Parisian was contented, and paid his taxes to Baron Hausman’s architects and M. Alphand’s landscape gardeners.

Such a sweeping reform could never have been done, we need scarcely inform our readers, in this country, with lynx-eyed senators ever watching the purse-strings, and a Parliament that has disputed (how many years?) regarding the site of the new Law Courts. Not that here is no necessity for it; quite the reverse. We may say many a hungry French *émigré*, as he wandered out of the purlieus of Leicester Square, has looked with envy upon the narrow arteries of the city—Cheap and the Poultry—and thought what magnificent carriers could have been erected there if we could but take it into our heads to cry “Long live Citizen Beales and the Republic of Great Britain!” “What a magnificent city to sack!” half to himself, half to the aide-camp at his side, exclaimed Prince Blucher, as he

rode in state through London in 1815. It is not very likely, with the Right Hon. Robert Lowe hungering after a surplus, at the receipt of custom, that we are ever likely to attempt any such thing; but suppose we were, in our own small way, to try to make London—the richest and greatest city in the world—a place tolerable to exist in, for something more than a few thousands of the 3,000,000 of its population, what a row there would be! The reviewer’s imagination—aye even the imagination of a newspaper reporter—fails to conjure up the processions to Trafalgar Square of the indignant “working man,” the outcry of the “Halfpenny Candle,” the blast of the “Daily Trumpet,” and the endless deputations which would be for ever knocking at the Treasury door. We think we can see a highly fed and rather bumptious deputation of the Mayor and Corporation of the “large and influential” burgh of Bullock-Smithy in their best clothes, waiting on the Chancellor of the Exchequer, first to protest against this base appropriation of part of our £70,000,000 of revenue, and then to shew, if there is any to be spent, the superior claims of Bullock-Smithy upon a grateful country, how the Town-house chimney is in a state which renders a fire dangerous to be lighted, all because there are no funds to sweep it; and how the state of repair of the parish pump is disgraceful, Sir, disgraceful! Then the Mayor and Corporation (“after thanking the Right Hon. gentleman for his courtesy”) would go home again, and call a public meeting, and a unanimous vote of want of confidence would be passed on the Ministry; and at next election, the once highly respected and popular member for the town would be—not only pelted with rotten eggs (which is a Briton’s privilege), but after paying the usual figure to the free and independent electors, would lose his seat. A few repetitions of this would settle the point, and London would forever remain the dirty collection of narrow lanes it unfortunately happens to be. It is to be feared that we are a nation of shopkeepers—no doubt a very sensible and useful one—but still of the shop—shoppy. Of course we all know that we are the “pride, envy,” and all the rest of it, of the unhappy nations outside our borders; but still somehow or other they manage to surpass us in providing amusements, health, and pleasure for the people with the people’s money. But then you see, we are not addicted to what Artemus Ward used to call “revolushing.” The nearest approach to that is a meet of rather windy patriots at the base of Nelson’s Monument, or a Fenian blackguard murdering his landlord who presumes to ask for a little rent, and then, under the excitement of patriotism and whisky, proclaiming the Irish Republic. Private Jones, of the Buffs, distinctly declines to “fraternize” with such citizens as these, and nothing short of a stoppage of his wife’s share of the regimental washing would tempt him to do such a very absurd thing. The mere suggestion of it would probably entail upon the tempter’s head the severe “punching” it would deserve. Perhaps, after all, it would be a little unjust to orna-

g the Irish Republic. Private Jones, of distinctly declines to "fraternize" with such these, and nothing short of a stoppage of share of the regimental washing would to do such a very absurd thing. The mere

of it would probably entail upon the lead the severe "punching" it would deserve. After all, it would be a little unjust to ornamental at the general expense of the nation. Parks on London with the pride a Frenchman prides. To an indweller of that city, as well as the whole Empire, Paris is the centre of the cynosure of all eyes, and the place to thoughts continually recur, no matter where the contrary, though the veritable Cockney a pride in London, it is chiefly because he places else so well; but with the majority of imply a place to be visited, and then left. ly, we should have decided objections to see expended on the beautifying of a place many I never see, or, at the best, only hurriedly days in. The same, however, cannot be works descriptive of these parks and beautiful all share alike in the pleasures to be derived perusal of the description and the sight of the

the fairy scenes conjured up by the hands of architect and landscape gardener. And curiously as Mr Ayrton has issued a mandate to flowers in our parks, and the Edinburgh Council have in their wisdom resolved, as a tour, to give standing-room in some obscure beautiful fountain presented by the municipality a private individual, a work descriptive of improvements in the city of Paris, reaches us, the title of which we head this article is by M. Alphand, the Superintendent of the Parks and Gardens of Paris, whose name we have mentioned in connexion with Hausman's plans, and in a magnificent work in elephantine *Hollandais*, and all the glories which the engraver, the steel engraver, and the woodcutter to it—a perfect *œuvre de luxe*. The work is completed in parts, and we have already before us the first series, descriptive of the Bois de Boulogne, with numerous folio plates and maps of the scenes, and the chief flowers and trees cultivated, in addition to a profusion of woodcuts, executed in the finest style of French art. This work could only be produced among, it is by, a people fond of flowers, and proud of their beautiful park it describes; and it is not surprising to note that the first list of subscribers are the names of eighteen Emperors, Kings, and royal personages; while to give the name of and other high functionaries, would be to give a catalogue of the States and Courts of

Among these, however, figure *not one English name*—unless, indeed, we except the fair-faced lady, now no longer amongst whom he was once loved as the Princess Royal

of England, as she still is as the Crown Princess of Prussia.

The Bois de Boulogne is the last remains of the noble forest of Rouray, which stretched along the right bank of the Seine as far as Saint Ouen. About the twelfth century it changed its name, and from the name of the neighbouring village was called the Wood of St Cloud—though by this time it was much broken up. In 1319, some pilgrims erected a little church in the middle of the forest, like that of Bologne-sur-Mer, and from this circumstance it again changed its name to that now so universally known—the Bois de Boulogne—with various fortunes, the forest, always getting smaller, more circumscribed, and more civilized, was, in 1852, by what M. Alphand respectfully calls, "*une auguste volonté*," in keeping with the other changes in Paris—ceded to the city authorities, with orders to improve it, within four years, to the extent of 2,000,000 of francs. Long war, and the vandalism of *la révolution*, had much disfigured its fair proportions, but still enough remained to make, with taste and skill, a fine park. The authorities commenced by excavating the two lakes and forming the roads which surrounded it; some planting in the bare places was also done. The success which attended this attempt at improvement stimulated His Majesty to still further efforts; and to enable the city authorities to carry their designs the better into execution, the boundaries of the forest were still further enlarged. The new improvements, carried on until a recent period, were in the following order:—(1.) The conversion of the old straight lanes into sinuous routes, with conveniences for carriages, horsemen, and pedestrians; (2.) The formation of pieces of water, of three brooks fed by the overflow of the lakes, and directed to those parts of the wood most picturesque in their vegetation; (3.) The formation of the cascades of the Mare aux Biches and of Longchamps, formed by the chief of these brooks; (4.) The formation of a large meadow round the lakes on the bare parts which stretch along the sides of the Madrid, Bagatelle, &c.; (5.) The planting of large trees and choice shrubs on the islands in the great lake, the formation of the streams of running water, the cascades, the new entrances to the Bois, and the ornamentation of the principal routes; (6.) The construction of grottoes and summer houses on the islands in the lakes; (7.) The construction of paths, walks, &c.; (8.) and lastly, the appropriation to their new destination of the re-united pieces of the Bois in the park of Madridmaurepas, and of the houses comprised in the new domain.

M. Alphand gives an elaborate description of all the works necessary for the purpose, which is recommended to the perusal of landscape gardeners, but is too lengthy to analyze here, and unintelligible without the aid of figures. The result is, as all who ever visited Paris know, a lovely maze of wood and meadow, lake and stream, grotto and cascade, created at a cost which is the profusion of a dream—the whole work is

prising with new delight, and with nothing to weary, by its monotony, the jaded denizens of Paris. The trees and gardens are especially interesting. In the old wood there were doubtless many fine trees, but these, before the improvement had commenced in right earnest, had been to a great extent ruthlessly destroyed; still, however, there remain some fine trees of large dimensions. The chief trees now, however, are all planted, and comprehend, beside numerous species of deciduous trees suitable to the mild climate of Paris, all the hardier Conifere, and some which cannot stand the climate of these islands. M. Alphand has supplied excellent woodcuts of some of these, though, if we are to judge by the figures, we have many of the same species in this country which vastly surpass them in appearance and growth. Considerable nurseries are attached for raising trees; but independently of these, there exists a considerable collection of trees planted as early as 1819. The transportation and transplanting these occupied an important share of the work, and the machinery which is figured is worthy of the notice of foresters. The lodges and other architectural features of the Bois—not excluding the Abri de Cavalier, where horsemen can get shelter—are also worthy of attention. The rockeries are not the least beautiful of the works of art in this fine park, and altogether, whether viewing it as a pleasant resort, or for the skill displayed in its formation, it cannot be denied that the Bois de Boulogne has no equal in Europe. The only one likely to rival it in future years is the Central Park of New York, ostensibly formed after its model, but as yet in its infancy. The first portion of the work concludes with a list of the trees, shrubs, and chief flowers cultivated in the park. The other portions of the work we shall revert to at a future period.

Handy Book of Bees. By A. Pettigrew. W. Blackwood & Sons, Edinburgh and London.

THERE is the sweetness of the clover and the freshness and flavour of the heather about this book. And, what is of more importance still, there is in it the result, or at all events the instructions, how to get the honeyed result out of these busy little insect toilers who "improve each shining hour." The Rev. J. D. Burns was a good poet, but he did not care for bees. Birds were his favourites. The bee he considered rather a selfish misanthrope. So far as we can remember, he described Dr Watts's gatherer of honey "from every opening flower," defending its well-garnered store against intruders, like a miser his gold, by a vicious stung. Mr Pettigrew looks upon them in a different light altogether, as a class of insects which ought to be treated by persons in the rural districts as they treat their herds and flocks, with a view to profit. And we further think the practical man has the advantage of the poetical, though we sympathize with the latter in his extolation of the disinterestedness of the caged little songsters who "take no heed for the morrow."

But, while thoroughly practical, Mr Pettigrew's book is far from being dry. The perusal of it suggested to us at once Burns's lines—

"O blaw, ye westlin' winds, blaw saft
Among the leafy trees,
Wi' balmy gale, frae hill and dale,
Bring hame the laden bees."

And ever since we read the treatise, that last line has clung to our memory in a way that cannot be better described than in the words of Tennyson, when he or his hero was courting "The Miller's Daughter."

"A love song I had somewhere read,
The echo from a measured strain,
Beat time to nothing in my head
From some odd corner of the brain.
It haunted me the morning long,
With weary sameness in the rhymes,
The phantom of a silent song
That went and came a thousand times."

And Mr Pettigrew has good right to speak about bees—as good a right, indeed, as the heir to an entailed estate has to enjoy the property of his predecessor, as may be seen from the following extract from the preface to his work:—

"THE BEEMAN."

"The author's father, James Pettigrew, was a labouring man, and perhaps the greatest bee-keeper that Scotland has ever produced. He was so successful and enthusiastic in the management of his bees, that he earned and received the cognomen of 'The Bee-man,' and by this name he was well known for thirty years in a wider circle than the parish of Carluke, Lanarkshire, in which he resided. Even the district of the parish in which he lived when he kept most hives took then the name of 'Honey Bank,' which it still bears. And though the author left his native village thirty-five years ago, he is best known there on an occasional visit as 'The Bee-man's son.'

"While a common labouring man, he saved a great deal of money from his bees; indeed it was reported in the Glasgow newspapers that he realized £100 profit from them one season. His example and success twenty-five years after his death have not yet lost their influence on the successful bee-keepers of his native village, who say, 'The old bee-man taught us all we know; who taught him?'"

We shall not spoil our readers' enjoyment by quoting here and there passages from Mr Pettigrew's book. All we can say is, that it is a book which ought to be bought and studied by all apirians who desire to combine pleasure with profit.

British Sheep Farming. By William Brown. Edinburgh: Adam and Charles Black.

THIS is a very useful little treatise in the main; in fact a book that can be recommended for the Farmer's library. But the author at times is not so precise in his language as he might be. For instance, he tells us that "there is only one-third of the British Isles under arable culture, more than one-third unreclaimed, and

the remaining third is pasture lands." How can this be? If there is more than one-third of unreclaimed and, it must necessarily follow that there cannot be a "remaining third." It must be something less, surely. Then, again, we are told that Leicester sheep "have now no rivals for weight and early returns" in the Lowlands. What Mr Brown means by the Lowlands we cannot well say; but we are quite certain that Leicester sheep are not the heaviest of the long-woolled classes. Mr Brown, indeed, has tried to guard this statement, by affecting to look upon Leicesters as a type of long-woolled. But this will hardly do, seeing that Lincoln and Cotswolds are both recognized as distinct breeds in the Royal Agricultural Society's catalogues, and as such are entitled to be considered by a writer upon sheep. Mr Brown makes a mistake, when he says "there has been no really good cross between this [the blackfaced] and any other sheep." We have seen crosses from blackfaced at Ayr, which deservedly carried off the prize against half-breds.

The blots we have noted, however, are small compared to the merits of the book, which is written in a plain agreeable manner, as may be seen from the following extracts:—

REGISTRATION OF RAINFALL AND CLIMATE.

"There is no connexion whatever betwixt registration of large annual rainfall and a humid climate; and in this respect the purely practical man is apt to be misled. Some of the most arid parts of the world can shew the greatest amount of fall, but this fall is generally comprised within a very short period of the year, and often does more mischief than good. It is the regularly distributed rain—the fine weekly or bi-weekly showers—that the grazier can alone build upon for success in raising wool and mutton. Arranging the data on this head in the same way as we did for temperature—that is, in the nine divisions, and according to drainage by the cardinal points—the results keep true to the peculiarities of each district. In the south of England the least rainfall is in the divisions draining to the north, and the greatest in those draining to the south; while in the middle it is least on the east and greatest on the west; and for the north of England it is equal for the north and south drainage, and greatest on the west. In Scotland, we have first for its southern division a least rainfall by the north drainage, and most by the south fall; and in the northern division it is very distinct, as least in the north run and greatest also on the west. Ireland, again, is represented in the centre by a least fall in eastern drainage, and greatest on the west; and this is also the same for the north and south divisions.

"As a whole, it is shewn that the least rainfall is

on the land having an eastern drainage about equal by north and south, and very much larger by the west."

His practical remarks are generally worth attention, as instance his concluding observations upon

TREATMENT OF SHEEP.

"I am not a believer in the time coming when all our heath-clad mountains, or even uplands, will be under cultivation; but it is not difficult to see how a change could be brought about in our climate so as to admit of great extension of improvements in hill pastures, whereby more equable temperature and increased and better food would easily double the present number of sheep. No doubt there are still lands capable of improvement without requiring any assistance by change of climate, but the *great field* is so situated. The day is coming when our lowland and upland sheep will be *housed* animals all winter and part of summer.

"There is also too much indiscriminate breeding, too much running about for food, and altogether too much of a leaving-alone system of management.

"When a few descents deteriorate the breed, more special tup-breeding must be established, with a "herd-book," as in the case of cattle and horses.

"Then, the natural habits of the animal deserve greater attention than is generally given to it. Even the knowledge, for example, that sheep seek for fine pasture in the *morning*, and draw to the uplands or coarser ranges in the afternoon, would be valuable on many occasions.

"Again, the production of the sexes has received almost no attention in this country. That there is a law dependent "on the greater or less relative vigour of the individuals coupled," is proved from many experiments specially conducted in France. For example, the produce of a strong ram and badly-fed ewes, or ewes too young and too aged, was more males than females, and *vice versa*. It has also been noted that when the ram is strong at the beginning of the rutting season, more males than females are brought. This subject is still, however, very imperfectly understood.

"The great aim in sheep-farming is quick and early fattening, for which artificial food is indispensable. Turnips may now-a-days be termed "half artificial," as the use of so much other vegetable food makes them more the grounder than the finisher for the market. Variety and great extension of food is another of the problems to be solved.

"Good sheep-farming is just this—to keep each class in circumstances throughout the year most conducive to breeding, feeding, and wool; giving the right kind of food at proper times, avoiding extremes, and generally to be guided by lessons from nature."

use and Jake Frink's, and can now be o catch all the water from the two hills, nce of at least 1 mile, which used to go ie pond before it was drained. The f a road is good anywhere, I suppose from the manure that drops from pass-imals, and partly from the soil, which und up very fine by the continual ng of iron-shod feet, and the crushing els. I have noticed that wherever any dirt is run on to a mowing field, even there is hardly a trace of manure, it the grass much stouter, and you will : effects of it for several rods from the

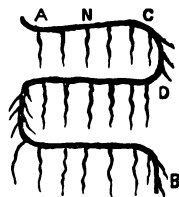
I have sometimes thought it would have a machine for grinding up soil ne for top-dressing. At any rate, there no doubt that all the wash of roads to be saved, wherever it can be turned grass land.

he roads that lead into villages and this wash is particularly valuable, e there is more travel to grind up the nd more manure dropped. Hooker-s a place of considerable trade, and I ie on an average there are fifty carriages orses that go by this field every day. ulate to make them all pay toll, and oute to the growth of my grass without g it. I think the wash that comes is hollow, when spread over 5 acres, ake more than £20 difference in the of the hay. Every farmer who has a milarly located, can erect an invisible te, and collect the tolls without robbing ghbours.

water from the brook I can turn on, times in the autumn or summer, after y is taken off. This brook comes from np covered with timber and underwood, very autumn brings down a great quan- leaves and vegetable matter. It also hrough meadows and cultivated fields, ter heavy rains carries a good deal of nd sediment. This, I think, cannot benefit vegetation, though it is not so ; the road wash.

: arrangement of the channels is a of considerable importance. It is from experiment that the grass gets

all the more valuable parts of the water and sediment in running 6 or 8 rods, so that the main channels should be about that distance apart over the whole field. If the field lies like mine, in the form of a parrallelogram, sloping to the south, the channels may be arranged as in the cut. The road runs



parallel with the north side of the field. The water comes in through the wall at *a*, and follows the main channel until it discharges at *b*. This channel is made about 18 inches broad at the top, and about 1 foot deep. It is kept nearly level where it runs east and west, so that small notches in the brim will pass the water off in nearly equal streams, These small streams are partly absorbed by the soil, in running 8 rods to the channel below, where they are caught and mingled with the muddy water again, and again passed off through small cuts in the brim, and so on until the whole field is irrigated. The fall is about 2 feet in the 8 rods, but the channels could be easily worked with much more fall, as the water would only run a little faster from *c* to *d* and in the parallel courses.

"Irritation of the land!" exclaimed Keir Frink, as he looked out of his coal cart, where he has stopped to hear what was said by the company. "What does he mean by that? I never heern of that even in the White-oaks, where they irritate almost everything from cats up to old hosses."

"He is gwine to turn a brook on here and get 6 ton of hay to the acre," answered Tucker.

"If he can," added Jones.

"And blame him he'll du it neow, ye see, for he's a master hand to carry his pint," said Seth Twiggs.

"Neow du tell," responded Keir, hitting his horse a smart lick, "Tim Bunker waterin a swamp! git up old hoss, this aint a safe place for yew."

And the old coal cart vanished up the hill as if the driver had seen a ghost. But I am not quite crazy yet, though some of my neighbours think I am leaning that way. I shall keep you posted on "the irritation of the soil."
—Yours to command,

TIMOTHY BUNKER, ESQ.

NO. XLI.—TIM BUNKER ON FEEDING WITH OIL MEAL.

"It's no use to try it," said Jotham Sparrowgrass, as he poked his cane into the tub where I was preparing a mess for my fattening cattle.

"No use to try what?" said I.

"Why, to fat cattle with iled meal. You see, the thing has been tried time and agin, and failed. Never could make the cattle eat the stinking stuff. Job Woodhull and Jim Mills both tried it one summer. You see they had heern a great deal about feeding animals with ile meal, and they took it into their heads to make a lot out of fish ile and Indian meal. They had a plenty of ile from their fish works, and they put in about 5 gallons to a barrel of meal, and mixed it up well. They tried to get oxen to eat it, but it was no go. They kept trying everything with it for a week or more, and by that time it was about the stinkenest mess that was ever got up. I guess they have'nt heerd the last of that ile meal yet."

"The oxen were sensible brutes for not touching such stuff," said I. "But you see, Uncle Jotham, this is not that kind of oil meal."

"Du tell!"

"You know there are certain kinds of plants that produce oil-bearing seeds, and when they are pressed for the sake of the oil, a cake remains, which is good for manure or for fodder. They press rape seed, and the refuse cake makes a very good manure. They press bay seed to get linseed oil for painting, and cotton seed to get oil for burning, for making soap, and other purposes. The cake that remains is ground up into meal, and is fed to cattle."

This talk with Uncle Jotham occurred more than ten years ago, when I first begun to use the meal made from linseed and cotton seed cake.

I had not much faith in it myself when I begun to use it, though I ought to have had; for linseed cake has been used for fattening cattle, and various feeding purposes, for several generations. It is astonishing to see how little faith people have in anything they have not seen and tried.

Once in a while we find a dairy farmer using oil cake for feeding. As a rule, they have no faith in buying anything to keep up their cattle in high condition. They sell grain, and feed out hay and grass. These, no doubt, are the staple articles of fodder, but all cattle will do better to have some addition to hay and grass. I have always fed everything I could raise on my farm—oats, rye, and roots—and have no doubt it pays. If anybody can use grain to a profit, the farmer can. The man who buys his grain expects to make a profit on it, and, in most cases, does so. Why should not the farmer feed his grain and make the profit himself? If there is a profit in feeding 20 bushels of corn to a bullock, the farmer, especially if he live near a good market, can make the profit a little better than anybody else. He wants the manure for his land, and the manure is on the soil where it will be ploughed in. There is no expense for carting it 3 or 4 miles from the village, or of shipping it 50 miles, or more, from the city.

I always liked to feed grain, corn meal, &c., but I think now the oil meal pays better than even the grains. The linseed meal comes pretty high, and that is one great objection to its use. But the cotton seed cake comes even cheaper than Indian corn meal, and I think does better than linseed, pound for pound.

I had not used it a month, before Jake Frink came along one morning and hailed me.

"What ye ben duin to yer cattle lately, Mr Bunker? I see the hair looks mighty sleek and shiny, as ef it had been combed with a fine tooth comb, and had some intment on tu it."

"You are right, neighbour, but the ointment was applied on the inside. I have been feeding with oil meal."

"What upon airth is ile meal? Never heern of sich stuff."

"Well, there is a fellow up here in Shadtown

the business of pressing cotton seed and sells the meal from the ground to farmers."

Tim was about right in describing the coat of my bullocks, though, and did not do full credit to John's and wisp of straw. They are and John takes a good deal of pride in getting them down.

I have been trying this feed for a year or so and think I get more for my money than I do of feed that I buy. It comes very cheaply, and goes further in making butter, cheese, beef, mutton, pork, &c. It is excellent for working cattle, making their coats early in the spring, and keeps them in good flesh. It increases the milk from 20 to 30 per cent., does somewhat, upon the condition of the calf, and I found about 2 quarts a day enough for a small animal. If fed too liberally, it gives a rather unpleasant flavour. It keeps the calf in a good thriving condition. In making a large quantity should be used; there is a taste imparted to the meat.

All cattle are a little shy in eating it, but in this respect, they are pretty much like their owners in buying it. But if a little bit of it is mixed with some palatable food, they will eat it, and soon become very fond of it.

One great advantage in using this feed is that it is the excellent manure. I have never had so much manure as I carted out this year, and I think it must be owing to the use of the 2 tons of cotton seed meal with my cattle last winter. It would make a great difference in the looks of the land if I had begun to use this article ten years ago.

But we must all live to learn.—
Command,

TIMOTHY BUNKER, ESQ.

—TIM BUNKER ON THE FARMERS' CLUB.

TO GET RICH BY FARMING.

It might be more modest to omit the following from the Squire, but it contains some interesting facts. And here allow us to remark that the following, which have been continued so long,

and we expect will be continued hereafter, are none of them "got up" in our office, as some have supposed, but are veritable letters. We are happy to know that the plain, homespun truths here told have been of great value to thousands who have read them, not only in this journal, but in many others, into which they have been copied.—ED. J.

MR EDITOR,—I have not had much to say lately about our farmers' club, that our minister, Mr Spooner, and a few of us started in Hookertown a few years ago. Well, you see, at first the thing didn't take very well. It looked kind of bookish, and men accustomed to the plough handle didn't exactly like to come to the school-house, where we generally hold our meetings in the winter, to learn farming. Some of them called it Mr Spooner's school, and some Tim Bunker's pew. Jake Frink, who has never forgiven me for buying that horse-pond field, and draining it, called it the Horse-pond Convention. In the summer time, we meet around at the farmers' houses, generally once a month, some Saturday afternoon, so as to look at the crops and stock, as well as to discuss questions. Well, by a little coaxing and management, we have got most of the young farmers in the neighbourhood of the village interested, so that we frequently have twenty at the meeting, and that makes about as large a company as a plain farmer cares to talk to. My immediate circle of friends are among the most punctual members. Mr Spooner and Deacon Smith are always on hand to keep things straight; Seth Twiggs comes up to see what he can through his clouds of smoke; Uncle Jotham Sparrowgrass limps around with his invaluable scraps of experience; and Tucker, Jones, and Jake Frink, drop in to see what new exercise is going on in Tim Bunker's pew.

The club is getting to be a good deal of an institution, if not a great one, in Hookertown. The last topic talked up was "How to Make Farming Profitable." We had a stranger into the meeting, Mr Pinkham, and he took the ground that it was not profitable, and for his part he did not believe it could be made to pay. He said "he had got a little property together, but he did not make it by cultivating the soil, though he had worked at it thirty

years steady. He had a farm given to him to start with, and if he had done nothing else but farm it, he believed he should have run in debt every year."

Uncle Jotham guessed Mr Pinkham was about right, if men managed their farms in the old way. He had known a hundred farmers or more, within 20 miles of Hookertown, and their wa'n't a half-dozen of them that got ahead any, until they begun to use artificial manures. But to have nothing but farm-yard manure, and next to none of that, he didn't think a farmer could more'n make the ends of the year meet.

"I don't believe he can du that," said Jake Frink, "unless he has better luck than I have had. I've worked hard as a nigger on my land, for well nigh forty years, and I hain't so rich as when I started. I hev ben allers comin short at the eend of the year, and every now and then, have had to sell off at a loss to some lucky naber. And it allers happened, that I sold jest the best lot I had, but didn't see it till arter it was gone. That horse-pond field, that didn't use to raise anything but sour grass and rushes, now bears 3 ton to the acre of first-rate grass. Some folks make farming pay, but I never could. Somehow it don't run in the blood."

Mr Spooner said farmers did not have capital enough to carry on their farming profitably. No man can be successful in business without capital. The merchant has his years of discipline as a clerk, and earns a small capital before he sets up for himself. But the farmer often runs in debt for his farm and has hardly money enough to buy his stock and implements. This keeps him

doubled all the time. He can't afford to

run no purse. He can't afford to

buy an horse. He can't afford to

run a horse. He can't afford to

run a horse. He can't afford to

run a horse. He can't afford to

better. As they used to say in sifering, o from o and o remains. It's jest so in farming."

"Them's my sentiments," said Jones. Now the fact is, both Tucker and Jones are lazy, and never did a good day's work in one day, in their whole lives. The cipher lies in the persons of those two individuals, and not in their purses. I didn't say that in the club; if I had, I guess I should have caught it.

I did have to say, however, that I thought the trouble about bad farming lay a little deeper than the want of capital or the want of labour. "The want of *brains*, I guess, lies at the bottom of all the unprofitable farming. What is the use of a man's having money, if he does not know how to apply it to his business? What is the use of a man's having labour, if he does not know how to direct it, so as to make it pay? *Farmers do not read enough about their business, and reflect upon what they read.* I know of a dozen farmers who have from £1000 to £5000 in the bank, and they have occasion for the use of twice that sum, in order to make their farms productive. Capital in the bank only pays 2 or 3 per cent. In the bank of earth, if wisely invested, it will pay 10 per cent. I have got 15 per cent. on what I have laid out on the horse-pond field.

"Above all expenses?" asked Mr Spooner.

"Yes, above all expenses, and I expect to get it for years to come. I do not find it difficult to make land pay the interest on all that you spend on it, and any man who will read and digest the *Magazine* can do the same thing.

"I've heard tell so much about that paper," said Pinkham, "and about improvements Squire Bunker has made since he began reading it that I have a notion to take it myself a try, to see what it is, any way."

"Naise it 'cause you rite for it, Squire," said the riggs; "to poke fun at me."

"I'll write some about Hookertown, and I'll get out of it that I don't write is about at least £100 a-year to me; and I guess this town is worth £1000 more a solid cash for the ideas they have got.

a bennyfactor, Squire Bunker, for and so many to read that journal," Twiggs.

ness they'll all find it out by-and-look at Smith's new under-drained l, where he harvested 40 bushels the acre last summer. Look at s garden with the tile in, and sub-raises £20 worth of stuff where aise less than £5. Look at Jake watering trough in his yard, and m's drained swamp, and new mad, to cap all, my reclaimed salt ag 3 tons of hay to the acre. I o by that operation, and I might and thunk my brains out, and I have thought of that. Improve-joing on all over the town, and they read. All the way up to can tell just what farmers read it is of the farms and buildings. n, my recipe for getting rich by o take the paper, read and digest id apply outwardly.—Yours to

TIMOTHY BUNKER, ESQ.

—TIM BUNKER ON BAD WATER.
STIR IN HOOKERTOWN.

pon airth do you s'pose is the my well?" said Uncle Jotham s, one morning recently. "We able to drink it for more than a

here's a cat in it," responded ington Jones, who is always at end to any business of his neigh-found one in mine, last week. ve found it out if I hadn't seen hair in the bucket. Smelt like i, depend on't."

e ain't any cat or rat in it. The clear as a crystal, and I had it last week, but it didn't help it

t wonder ef it had been pizenen," th Twiggs, with a slight twinkle id a puff of smoke that made the

kitchen blue. He loves to play upon the fears of Uncle Jotham, and knows his weak spot. "Kier Frink was round all last month, you know."

"You don't say that creetur is at home agin! I thought we'd got rid of him when he married the widder," responded Jotham, with a faint feeling at the stomach.

"Ye needn't lay it to Kier," said Jake Frink, "for my well has been out of fix all summer, and the boy wouldn't pizen our well. I know 'taint any thing uncommon to have the water taste bad in summer at our house. Water gets low, smells a leetle like the bottom of a ditch, and I s'pose it's for the same reason. It draws the smell out of the dirt."

"Our well used to taste bad in summer until I put them tile into the garden, and made the surface water run off through them into the brook," remarked Twiggs.

"Ye don't s'pose the bad smells come from the top of the ground, do ye?" asked Jake.

"That's a new idee," said Uncle Jotham, "but there must be something in it, for my sink drain ain't more than 10 feet from the mouth of my well."

This talk of my neighbours gives a clue to an evil that prevails in other communities besides Hookertown. It has prevailed here more than usual last summer, because the fore part of the summer was dry, and the springs and wells got low. You have pure water down in your city, for it is brought to you in iron pipes, that guard it against all the foul dirt and smells through which it has to pass. But out here in the country, where we brag about having every thing sweet and clean, we are often troubled with bad water, especially in the summer time. A good many of my neighbours have had to apologize a little for their water, though some of them got so used to it that they didn't know but 'twas the natural taste of all water. Somehow, there was a good deal that needed an apology that didn't get it. Even Deacon Smith, who is pretty particular about most things, had a well this summer, that gave out an "antient and fish-like smell." Folks that are afflicted in this way all wonder what's the matter with

the water, when the matter is about as plain as the sun in the heavens.

I suppose nobody thinks the water gets bad without some cause, and yet they talk just as if they believed so. Seth Twiggs has the right of it—this bad taste and smell almost invariably come from the surface. Now, Mr Editor, I don't want to disturb the stomachs of your readers, and prevent them from drinking water any more, for I am a teetotaler, and believe that Adam's ale is about the best article of drink that was ever put into a tumbler. But I must say that I prefer a pure article.

It stands to reason that water will run down hill, whether it is pure or foul, and will keep running till it finds the lowest place, whether it's the bottom of the well or the lower end of a brook. We see this when we dig a ditch, or lay down a tile. If it is put down 4 feet in the earth, it will draw the water on each side, for a rod or more, right into it. If the soil is very compact, or made up mainly of black earth, it would probably absorb all offensive matters in the water, until it became saturated or charged with the foul gases, when a good deal of filthy water would go down into the drain and be carried off. Now I do not want to disgust any of your readers by telling them that the contents of their sinks, cesspools, and stables, drain into their wells. They might take it as an insult. But let them just look at the location of their sinks and manure pits. If a drain 4 feet deep will draw water say 25 feet distant, how far will a well of 30 or 40 feet draw it?

Seth Twiggs thinks he cured his well by putting tile into his garden. That is only a part of the story, for the next season he cemented his ash-pit, and its contents now go regularly to the compost heap. The sink drain, too, that used to empty within 10 feet of the mouth of the well, is now intercepted by a row of tiles, carrying the water after it passes through the soil, off into the brook. The bottom of his well is loose gravel after he got down 30 or 40 feet and this has

been made still more loose by the digging and stoning of the well. The water would go through the whole circumference back of the stones 4 or 5 feet, about as readily as through a sieve. There is a great absorbing power in soils; but after a while they will not take up any more of the foul gases, and the sink water and other offensive matters must go down to the level of the water in the well, with very little filtering.

How far a well must be removed from the sink and other offensive places, to keep the water pure, will depend somewhat upon the circumstances, as the depth of the well, and the character of the soil. A deep well, of course, would drain the surface much further than a shallow one. Deacon Smith's well is 35 feet deep, and there is nothing offensive upon the surface nearer than 3 rods. I have no doubt that there is a connexion between the sink drain and the well, and that this is the source, in most cases, of bad water in wells.

But it will be asked, probably, by some wiseacre like Jake Frink, why then don't the water taste as bad in winter as in summer? Jake don't see that it makes a mighty difference whether he have five pounds of good beef in his soup, or barely a knuckle of mutton. In winter, the soup is diluted. Rains fall abundantly, and not unfrequently the wells are raised 10 feet or more, so that they do not draw water from so great a distance. The water, too, is generally much colder as it comes to the table, and the bad taste, if there be any, is not so perceptible as in warm weather.

Seth Twiggs has hit upon the remedy. If a garden is not tile drained, the sink receptacle should be a cemented cistern. You can only keep foul matters out of your well by taking care of them. Worked into the compost heap, and then applied to the lands, they will give you nice vegetables and health. In the wells, they will give you bad smells and disease.—Yours to command,

TIMOTHY BUNKER, ESQ.

The Garden.

FLORAL DECORATIONS.

THE ELEGANCIES OF MODERN IN-DOOR DECORATION are assuming an importance commensurate with intellectual and social advancement. No sooner is a lady of the house—very properly let it be said—begins to form ideas of schemes to extend her dominion, and raise herself higher in the social circle. No matter what the bent of her inclination may be, whether in the collection of paintings or in the grace of the public rooms of her residence, or of antique porcelain or china, to add to the interest of the knowing and the curious in such matters; or of a museum of objects of a nondescript character—which, it is oftener the bent of the minds of the masses of the creation—each draws within its sphere a certain class who can appreciate and command such things. By the contact of sympathetic opinions an additional interest is awakened and fostered for enriching ones. Taste in matters of the kind is imperceptibly, so that what might be upon at first as a curiosity, if it happen to be new, has some new hidden beauty discovered every morning in the eyes of the fond and enthusiastic owner. If the palate is trained for taking to certain things by the process of an acquired taste, so can the eye be trained to look upon certain objects containing a beauty which other eyes cannot be trained to see. One would think, in the matter of those objects of creation—the beautiful flower-foliaged plants—that there would be a general constituency of an admiring public, but even in the matter of flowers one cannot admire them, at least, admire them enough to spend money upon them. One does not see beautiful flowers of spring, that

Shelley has immortalized in the following stanzas, which peep forth in the well-clad woods, and glades, and glens of many of our aristocratic domains, have not sufficient charms to win the hearts of the stolid and indifferent :

The snowdrop and then the violet,
Arose from the ground with warm rain wet,
And their breath was mixed with fresh odours sent
From the turf, like the voice and the instrument.

Then the pied wind flowers and tulip tall,
And Narcissi, the fairest among them all,
Who gaze on their eyes in the stream's recess,
Till they die of their own dear loveliness.

And the maid-like lily of the vale,
Whom youth makes so fair and passion so pale,
That the light of its tremulous bells is seen
Through their pavilions of tender green.

But flowers, however charming as individuals, can be abused in the matter of arrangement. They have certain claims upon those who tend them, and the first of these claims is, that they be set in position to the best advantage. Nothing can be more incongruous and untasteful than to see a variety of flowers and flowering plants set into a greenhouse with a total disregard to the laws of contrast and shading of colours. No home of taste would permit this with impunity. But the greenhouse and the conservatory are not only amenable to criticism; it pervades the Wardian case, the plant verandah, and the entrance hall. The more beautiful and the more artistic the design of the reception space, so much the more does the incongruity become patent, and totally subversive of order and taste. This is so often apparent, even in the great gardens of the land, that we cannot but draw our readers' attention towards it, if possible to correct the evil. It is only within the last few years

To the ladies chiefly we are indebted for a revolution in plant taste. Whenever in-door decoration became so fashionable, ladies demanded, along with flowering plants, their favourite *Adiantums*, the beautifully variegated and marbled *Crotons*, and the equally effective and invaluable, for that sort of work, *Dracænas*. Now they are taking to palms and all elegant foliage plants that are found to stand the fatigue of an in-door atmosphere, and by that means every plant-case in city and suburban gardening has less or more of these subjects to qualify the brighter tints of flowering plants.

houses, furnish quite a lesson to many of our countrymen. That branch of trade is well catered for in Paris, and the surprise is that among so many plants not remarkably well cultivated, the grower for sale should be able to turn them to so good account. We do not for a moment pretend to assert that they are in a position to decorate apartments upon the same grand scale as is done occasionally by Veitch, Williams, and such men ; but they can do up hundreds of places so well and so cheap, in comparison to what is done in our country, that a comfortable living is gained by that, and that almost alone.

All homes of taste should therefore look to the furnishing of plants of fine foliage, as well as of purely flowering plants. The Wardian case is quite unsuited for developing flowers, owing to the condensation of moisture that prevails, and therefore ferns, club-mosses, and high-coloured leaved plants is the desideratum. But for the plant cabinet a mixture of both is desirable. For the decoration of apartments, where plants can be drafted from the pits and greenhouses, what can be more captivating than the lovely *Primula cortusoides* amœna, with its bright red blossoms, so fully developed while we write, nestling among some of the numerous lady ferns which are multiplying so fast as varieties, and so dissimilar, too, as might almost warrant a place of position for them and them alone. True the plants get a little jaded and injured from confinement; but it is wonderful, if they be carefully attended to for the first week or two afterwards, how they smile upon the efforts of care you have taken to recruit them. There may be a percentage of deaths, consequent upon confinement, if the plants be extended beyond what is known to do well; but the amount of gratification which has been afforded to self, and friends and visitors, is no inconsiderable compensation for losses.

the same degree of tasteful arrangement should not be confined to in-door apartments and plant-rooms, it should be extended out of doors. Homes of taste may be said to have but perfected these arrangements, when the garden is not only trim and neat, but

ering plants have been set in to e picture quite as picturesque and us, as, for example, a well-designed ed rockery. Beautiful-leaved plants ; absolutely necessary to tone down lours out-of-doors as they are in- A bed, for example, centred with the bright coloured pelargoniums, l with such a plant as the yellow i, commonly called golden feather, t be bad taste set upon a lawn with adjuncts. How much more, how- lld the effect be enhanced by the dition of a single plant of Humea which, with its long depending in- se, adds not only beauty but grace ill-balanced parterre!

FOR ARRANGEMENT OF FLOWERS.

rrangement of colours in the garden, lld be placed so as to have its beauty and heightened by the colour next ake for instance the three elementary red, yellow, and blue. It will be nce that they are most effective in r. Place a wafer of either colour et of white paper, and look steadily a minute or two, and it will appear ounded with a halo of a secondary lementary colour, as it is called. lours so formed seem needful for the faction of the eye, and are always ry if placed against the primary colour g them. The red wafer will have of green, the blue of orange, the purple: therefore, purple, orange, and re the complimentary colours to lue, and red, and always please when beside them. Orange is likewise entary to lilac; greenish yellow to ndigo to orange yellow; and red, of ith green in each case. In planting, es the place of green—a green bed ver being admissible, unless on a ed gravel, or as boxscrolls. Gardens on red gravel should be furnished ith what we term *cool* colours, such lilac, white, blue, and yellow. In eds or borders on grass, warm such as bright purple, pink, scarlet, nge should predominate. Foliage

plants and *neutrals*, that is, plants of no very decided colours, such as the old variety of heliotrope, scented geraniums, &c., are now much used with good effect to tone down the glare of bright colours. Here are a few examples which will look well, either in rows or beds:—

First.—1. Next the turf variegated alysum or *Cerastium tomentosum*; 2. *Lobelia speciosa*; 3. Golden Chain, or Lady Cullum pelargonium.

Second.—1. Golden Chain pelargonium; 2. Purple King verbena; 3. *Calceolaria amplexicaulis*; 4. *Pelargonium Cybister* or *Stella*.

Third.—1. *Lobelia speciosa*; 2. *Centaurea candidissima*; 3. *Coleus Verschaffeltii*; 4. Yellow *calceolaria aurea floribunda*.

Fourth.—1. Golden-leaved pelargonium or Golden Feather; 2. Silver-leaved pelargonium or Flower of Spring; 3. Silver-leaved pelargonium Lord Derby, or Clipper; 4. Yellow *calceolaria*; 5. *Perilla Nankinensis*; 6. White *Dahlia floribunda nana*, or *Ageratum mexicanum*.

But these must suffice for the present, and are merely as examples of effective planting. The same principles may be applied to the sowing of annuals, either in rows or patches, or in the furnishing of borders. It is only needful to see that two colours that would neutralize each other do not come together. The Golden Feather (*Pyrethrum*), for instance, would be lost against a mass of *calceolaria* or *Calliopsis Drummondii*; but place it against Purple King verbena, *Lobelia speciosa*, or *Nemophila insignis*, and it is like a sheath full of golden sunbeams athwart the horizon.

In arranging plants for the best effect, their heights and habits must be studied as much as colour. The tallest must be placed farthest from the eye, in back or central positions; and plants that either harmonize or contrast well in style and habit should go together. Yellow *calceolaria* always looks superb against *Perilla*; Purple King verbena against a silver-edged pelargonium; *Lobelia speciosa* against a golden-leaved pelargonium, or interlacing the silver *cerastium*; and the *Coleus Verschaffeltii* resting on a broad d of *Centaurea candidissima* or such edged pelargonium as Flower of Sp

NATIVE ORCHIDS AS GARDEN FLOWERS.

OF all the wild flowers which command the admiration of country rambles, and delight rural bouquet gatherers, by the modest elegance of their growth, the rich diversity of their colours, their agreeable fragrance, or the beautiful markings of their foliage, none are more universally admired and coveted than the wide-spread race of native orchids; which have their representatives on the exposed seaward downs, as well as in the sheltered woodlands; on dry sunny banks, and in peaty marshes; in rich lowland meadows, as also in upland moorlands and in mountain tarns. When gathered and transferred, with ordinary care, to the parlour flower vase or water jug, most of the kinds continue unimpaired till the natural term of their decay. And often do they call forth the common but unfounded remark—"What a pity that such things of loveliness cannot be grown in the villa garden." That they can however be thus grown, both easy and successfully, it is our present purpose to shew; and all who will give them a fair trial, will find in them unequalled successors to their hyacinths and other spring bulbs, throughout the summer and early autumn.

British botanists describe about two score of indigenous species of the true orchises and their family allies; besides which, there are a good many varieties, differing less or more from their types in form or structure; and, what is of more importance to the mere flower lover, there are many sub-varieties distinguished by the great diversity of their general colours, as well as of their coloured markings. Commencing with the earliest, and certainly not the least showy kinds, we have, in May and June, the Orchis Morio, common in the chalk districts of England; and *O. mascula*, frequent in many pastures throughout the length and breadth of our island. Both have usually richly purple coloured flowers, which a closer inspection shews to be beautifully marked

with streaks or spots, but they frequently present different shades of light rose colour, and are more rarely pure white. In both, the leaves are usually green, but they are occasionally more or less blotched and spotted with brownish black, these spots being sometimes large in size, and very showy.

In a catalogue of plants found in the neighbourhood of Faversham, in the county of Kent, by Mr Edward Jacob, in 1788, that author figured a double-flowered variety of the *O. Morio*, of which our engraving (fig. 1) is a copy, and a few of which then grew in a meadow near Cades, in Ospringe. Some years since, Dr Paterson, of the Bridge of Allan, also found a double-flowered *O. mascula*, in the neighbouring parks of Keir. This shews that although remarkably rare, double orchises are not altogether a myth, and double forms may yet be found of all the others, as well as of those two; hence, so to speak, the field for orchid research becomes doubled, as this property of peculiarity may extend to all the other species and their varieties.

Anything like a description of all the native orchids would far exceed our limits; but coming in succession to the preceding, we may mention the still more common *Orchis maculata*, and *O. latifolia*, both with the corresponding variations in form and colour of their flowers and foliage. Among the fragrant kinds *Gymnadenia conopsea*, an inhabitant of dry hilly pastures, stands conspicuous.

Then come the white butterfly orchises *Habenaria bifolia*, and *H. chlorantha*. The beautiful rosy purple, *O. pyramidalis*, and the fragrant Lady's Tresses, *Neottia spiralis*, both flowering in July and August, are common in the south, but the former rare in Scotland. *Epipactis* is a handsome growing genus though less showy in the flowers than some others; *Cypripedium calceolus*, or Lady's Slipper, is not only the largest flowered orchid

the most beautiful and interesting
ive plants. Peculiar to the tribe



g. 1. Double-flowered Orchis Morio.
mber with green flowers, which, if not
deserve at least the appellation of

pretty, and in some instances even that of handsome; of these the *Habenaria viridis*, *Listera ovata*, and *L. cordata* may be called the the commonest.

Then follow the curious *Corallorhiza innata*; the Green Man orchis, *Aceras anthropophora*, with others of the chalky districts; and the minute Boy orchis, *Malaxis paludosa* of the higher Grampians, which is perhaps the most unlikely of all for cultivating, except under glass shades, as it grows more like an epiphyte than otherwise, upon the spongy moss of alpine bogs.

In cultivating our native orchids, all of which belong to the terrestrial or earth-growing section, in contradistinction to the more showy exotic epiphytal ones that grow upon the stems and branches of trees, the first indispensable requisite is to take up the roots carefully, so that both the bulbous or fusiform appendages are retained entire; for the one belongs to the existing plant and the other to that of the following year. Next observe the nature of the soil in which they are growing, also whether they are exposed or shaded; and assimilate them to these as near as possible when transferred to their new abodes. All dry terrestrial kinds, such as *O. mascula*, *O. Morio*, *Gymnadenia conopsea*, &c., will succeed in ordinary lightish garden soil where exposed to the sun; and although *O. latifolia*, *O. maculata*, *Habenaria bifolia*, *Listera ovata*, &c., will grow in a similar kind of soil, yet they will thrive better in situations that are shaded from hot mid-day sunshine. Those that are indigenous to chalky districts should have a free allowance of calcareous matter mixed in the soil, which, in the absence of chalk, may consist of old lime rubbish, bog marl, calc-sinter, comminuted shells, &c. Insert the plants only a very little deeper in the earth than they have been before, and on no account allow the soil to be afterwards dug or loosened about them; for it is this unnatural interference with flower borders which frequently causes the loss of the rarest and best of their inmates.—*William Gorrie*.

REMOVING PLANTS OUT OF POTS INTO THE OPEN GROUND.

THIS, like almost everything else, is wonderfully easy and simple after it is learnt. But it is by no means so simple a matter for those who have never done it. Let the plants be thoroughly soaked with water the day previous. Enough must be given to saturate every nook and cranny, every root and atom of soil, within the area of the pot. It is also a good plan to use manure water or house sewage for this final watering in pots. Thus the entire contents will be enriched as well as moistened—food and drink being provided together. This thorough watering also facilitates the removal of the plant from the pot. The moisture acts like grease to the side of the ball; it makes it slip out, and it slips all the better when it has had ten or twelve hours to saturate the pot, as well as to find its way through the network of roots and soil that it contains.

Having thus carefully lubricated both ball and pot with water, clean or foul, and allowed it sufficient time for the excess to pass away and the remainder to do its proper work, proceed to lay hold of a pot with the right hand, and turn it topsy-turvy—upside down—placing the left hand under it to receive the ball on the open palm. In doing so, the fingers of the left hand must be spread out so as to allow the stem of the plant to pass through between any two of them. Thus the top will escape being bruised or broken, and the portion of the soil that formed the surface of the pot with the plant remain in the pot with

[illegible]

and shew their resentment by breaking at once, if knocked against bricks, or stones, or iron. But unless the plants have been allowed to stand too long, and their roots have got too firm a hold on the bottom or sides of the pots, or, as it is technically called, become matted, there will be no difficulty in turning them out.

The villa gardener may probably find the next step in the matter more troublesome. It is no enviable position to be left with a plant in the open palm, its head sprawling through the fingers towards the earth, and its roots in the air. What shall we do with it? This, first of all : with the fingers of the right hand pick out the bit or bits of broken pots, or bricks, or charcoal that has formed the drainage over the hole of the pot, and carefully disentangle the roots ; that is, unravel and spread them up, without, however, re-



moving more than an inch from the bottom of the soil. Then, if the roots have been so jammed together through the substance of the ball, prying them along the outside of the ball, probably with the fingers, or, better still, a sharp-jointed stick about 9 inches long, to untwine them slightly. This operation requires great caution and much patience, as many of the roots are easily broken. Fig. 1 is a rough sketch of the plant when it is taken out of the pot. Fig. 2 shews the same plant with

disentangled and spread out, as recommended above. Supposing the plant to be in the state shewn in fig. 1, the plant would have to unwind themselves, or be forced to be formed, before they could break out of the earth; whereas, in fig. 2, the roots are placed in readiness to take advantage, and make immediate use of the new larger, the rich earth. We let the plants to help themselves; and do more than this, we start them in the way of doing so. Habit is second nature to vegetable as in mental life. Make the roots of plants run in circles in pots, they will continue to do so for a considerable time after their removal into the open ground. The roots repeat by rote, as it were, the circular spell. By disentangling them from the circular spell, and thus extend the range of their foraging ground. And this suggests another practice of the utmost importance.

Next point in the process of planting, is to place the roots under ground. For this a hole must be made of sufficient depth to bury the entire ball, with its network of roots, an inch or two deeper than the pot. More than this might kill the plant, less will hardly do justice to the plant. Nevertheless, it is safer to plant such choice silver and golden tricolor geraniums, just level with the depth they occupied in pots. It is almost as dangerous to bury their stems deeper than this, as to bury the bole of a tree. But such choice verbenas and calceolarias, that root freely, may safely be buried 2 inches below the pot surface. But the proper depth of the hole is of even greater moment, it should be as broad as the disentangled roots, and etched out to their full length. When the plant is laid out, the hole is seldom made larger than the ball, as seen in fig. 1. But fig. 2 shows a hole of double or treble this area. It is an immense advantage to the plant. It is within its reach, at once, a larger and freer edging ground. These holes are best made with a semi-circular planting trowel. The trowel is firmly in the right hand, and throw the earth. When the hole is large enough,

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carefully insert the plant, by taking hold of the ball with the right hand, and place it, by the ball, into its new home. Some people seize the plant roughly by the top. This is a bad plan, and frequently ends in the breaking away of the loosened ball. It seems almost like nursing a baby by the hair of its head. The plant should be tenderly lovingly handled by the ball, not the top. When it is placed in the hole, fill in the earth with the right hand, and keep the chief roots in a horizontal position.

The filling up proceeds, with constant fingering with the hand. For want of attention to this, nearly all the advantages of spreading out the roots are often thrown away.

An immense deal of the success of flower growing in the open air, depends on a good start. Hence, the importance of attention to such minute details. The late Mr Loudon never said a truer thing, than that "Gardening was attention to trifles."

Another trifle or two demand attention before leaving the plants to take care of themselves. The first is, to press down the soil firmly around the roots, with the trowel or fingers; and the second is to finish the planting, by washing the soil closely down around the roots.

Much may be done to quicken growth on poor soils, by placing a trowel full of rotten dung in the bottom of each plant hole, and another or two among the roots as the planting proceeds. This helps the start, and gives the plants more power to cater for themselves afterwards.

Novices need some system to make the selection of the proper places for the plants easy. When a bed or border is fairly smothered over with beauty, it matters not how the plants are distributed. But the smothered season is often long in coming, and in villas especially it may never arrive. Besides, it is always best to have everything pleasing to the eye at first. Order is heaven's first law, and nothing conveys the idea of order in a garden more than regular heights and proper distances. The highest plants should always be placed farthest from the eye, and all plants should be inserted

regular distances. This applies to what is termed the grouping system, and not to the irregular mixtures, where all kinds of capricious arrangements are in place. But suppose a bed is arranged in hues of colour, the first line should be at the same distance from the grass or gravel all the way, and the plants be placed at equal distances from each other. The next row might be closer or farther apart, according to the plants used; but it should be the same distance from the first throughout its entire length, and the plants in it be likewise equally distributed. For instance, if the first line were *Lobelia speciosa*, and a foot from the edge, and the plants 6 inches apart, these distances should be maintained throughout. A foot farther back *Lady Cullum pelargonium*, 9 inches apart, might follow suit. But the charm would be destroyed were 18 inches put either from the *Lobelias*, or between the plants to be substituted, here and there, for the foot or 9 inches respectively.

The easiest way to manage all this without trouble is to line out the entire bed before planting. No plan of doing so is so simple as a 2 feet length of garden line tied to two sharp pointed sticks about 2 feet long. Taking a stick in each hand, and rolling up or extending the line at pleasure, run one stick round the outside edge, and draw a second line the desired distance from it. Then use this line as the drawing line for the second, the second for the third, and so on, until the whole are finished. The chief points are to keep the outer stick firmly pressed against the outside edge, to keep the line tightly strained, and to have the two sticks always parallel to each other, see dotted lines. After the first line is drawn it follows the guide

the second, and so on. Then the distances between the plants can be marked on the lines and the plants look orderly, and as if they were planted with skill at once. There

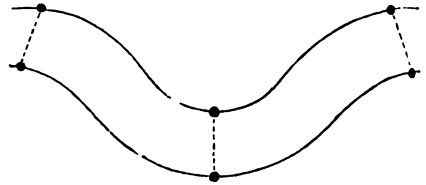


Fig. 3.—Diagram for arranging Plants.

is yet another advantage in lining out the ground. Where the earth is hard and much planting to be done, a spade instead of a trowel may be used to remove the earth along the line to a depth of 8 or 10 inches. If this is done and ended, in any case it is best to begin planting in the centre of the bed, and then there is no treading upon the planted portion. In irregular figures the centre lines have to be arranged on a compromise. Proceeding inwards from the sides the lines may meet and intercross in the centre. Practically there is little difficulty in setting the plants in their right places. The centre may just be planted thicker than the sides, so as to hide at once any confusion that may arise there, and then the regular lines will hug the centre ones in regular form all round. I forgot to say that the ground ought to be raked fine before it is lined out. It is impossible to give an idea on paper of the advantages of system in all such matters. Lines of men in a battle are hardly more necessary to success, than system, order, and sure and certain plans, in all matters horticultural. They impart confidence, save time, and ensure success.—*D. T. Fish.*

PROPAGATING OF PLANTS BY CUTTINGS.

Of all the operations of the villa gardener, the one above all others in value is the propagation of plants by cuttings.

It is the fount from which the plants come, and becomes inexhaustible in the hands of a careful operator. I say careful operator, rather than a skilful one, for by estimation, a great amount of success is not so necessary to success as the ever-flagging careful application of knowledge should be made.

Long held the opinion that the necessary knowledge to successfully propagate cuttings is very simple, and may be imparted by writing, even to one of no acquaintance whatever with the subject.

I will first state the system practised by nurserymen and applicable to all plants which possess a greenhouse or a stove or hot-water pipes, following that suited for amateurs, who have at best a small greenhouse possessing no apparatus, or, perhaps, no accommodation except a shelf in a sitting-room.

In the habit of placing 3 or 4 inches of rotted refuse hops, tan bark, or some other material, well beaten down, over the hot-water pipes, which are first covered with flagging or flagging. Over this I put 2 inches of sand. My reason for using the first named materials, passing through them before it reaches the trench in which the cuttings are placed is, that it is modified, and approaches to the genial heat of the hot-bed. This is by no means indispensable to success, sand alone, placed on the boards to the depth of 3 inches, will serve the purpose very well; but when the material can be procured conveniently, I think it to be preferable. Some gardeners are very particular to particular colours or textures; but I think that these have nothing to do with the rooting of cuttings. In my experiments, I have tried

sands of all colours and of nearly all textures, together with charcoal dust, brick dust, coconut fibre, rotted refuse hops, and many other materials: cuttings root in all in nearly the same time and with the same success; satisfying me beyond all doubt, that the material in which the cutting is placed acts merely as a medium to hold the moisture. I use sand because it is a clean and convenient material to work with, and is generally easily attainable. In my earlier experience, I was a victim to the popular notion that it was necessary to use silver sand in the propagation of particular plants, and was for years at much trouble and expense to obtain it. With exceptions so few, and those of so little importance that it is hardly worth while to allude to them, cuttings of all kinds root freely from slips taken from the young wood—that is, the succulent or unripened growth that a plant has made. The proper condition of the cutting or slip at the time that it is inserted in the sand is of great importance—a condition which it is astonishing to believe is so little understood among gardeners. Somehow the idea has become current that every cutting must be made by cutting just below a joint, or just at one. The practice of this system leads undoubtedly to many cases of failure; not that the mere cutting at or below a joint either assists or hinders the formation of roots, but from the fact that when a slip is cut at a joint the shoot has often become too hard at that point, while half-an-inch higher up, or *above* the joint, the proper condition would be found. The safest rule for the novice to adopt in propagating all kinds of soft-wooded plants is to bend the cutting on the shoot; if it breaks or snaps, as in the upper part of fig. 1, it is in the right condition; but if it can be bent without snapping, as shewn in the lower part of the same figure, it is then too hard. We know it will root even in this hard condition, but it will root more slowly, and the roots emitted

will be hard and slender, and, as a consequence, will not be likely to produce a plant of the same vigour as that made from one in the proper state. In propagating woody plants, such as roses, azaleas, daphnes, &c.,

necessary to make the cutting at a joint. The doing away with this custom in propagating roses enables us to increase the product of a plant at least twice as much as if we



Fig. 1.—Right and Wrong Conditions of Cutting.

this test of breaking or snapping does not apply, although all these will root if taken in the same way; yet we find it enfeeble their growth more than if the cutting is allowed to get harder. What this degree of hardness is, it is difficult to describe: in roses it assumes



Fig. 3.—Rose with several Eyes.

practised under this dogma; for the cutting will root just as well, and become quite as good a plant, if made with a single eye



proper degree of hardness when the shoot develops the flower-bud. But, although we do not take rose cuttings in the same state of condition as we would a fuchsia or a geranium, we have imagined that it is



Fig. 4.—Dahlia Cutting.

fig. 2), as if cut at a joint having two or three eyes (fig. 3). Although we have said that cuttings can be easily rooted with-

being cut at a joint as otherwise, there are, in some plants, other considerations that necessitate that they should not be cut except at a joint; for example, a dahlia cutting will root quite as freely, make a flowering plant in autumn, and the fibrous root increase to its full size; but it will not be able to start again in spring, because the dahlia pushes only from the crown of the old root, and if the crown has not been removed from a cutting cut close below a joint, as in fig. 4, it is worthless, as the tubers or roots formed without an eye possess no latent or dormant buds; hence the importance of always making dahlia cuttings by cutting immediately below an eye, *if the roots are wanted for future use.*

In cases where it is desired to make the cuttings of new plants, we sometimes split the



Fig. 5.—Split Cutting.

cuttings, as shewn in fig. 5. This method, however, is not generally desirable, and we must be cautious if, except in cases of calceolarias, and in other plants of like character, it is ever the best method of practice.

If a plant is perpetuated by cuttings with difficulty, we usually find it is freely increased in some other way; thus the Cyclamen, some varieties of Clerodendron, &c., are slow to increase by division or cuttings, but are abundantly multiplied by seeds. Again, Bouvardia, Anemone japonica, Pyrus japonica, Calycanthus, &c., are slowly increased by cuttings or shoots, while by cuttings of the roots they are propagated with the greatest ease and rapidity.

The roots of such plants are thickly studded with latent, or, as they are termed, *adventitious* buds. These are cut into pieces of half an



Fig. 6.—Root Cuttings.

inch or so in length, as in fig. 6, and are strewn rather thickly in the pans, and covered over with an eighth of an inch of sand, mixed with some *light* material, such as finely sifted rotten refuse hops or leaf mould. These are treated exactly in the way of cuttings of the shoots, except that there is no necessity ever to shade root cuttings; water should be sparingly given until they have freely started through their covering.

I have said that if the simple conditions that we lay down for our guidance in the propagation of plants are strictly followed, failure is an impossibility. These conditions, together with the state of the cuttings, are

temperature and moisture. It is very easy to give a rule for these, yet it requires unremitting attention to keep to that rule through all the deviations of the season; and it is utterly impossible to follow it, whenever the outside temperature exceeds the limit given. I have mentioned the subject of temperature, to fix in the mind of the reader what I believe to be of great importance, and to prepare him to understand, if failure occurs, where to place the cause, for without much doubt every case of failure is traceable either to the unsuitable condition of the cutting, irregularity of moisture, or temperature.

The most proper condition of temperature, to root cuttings of the great majority of greenhouse and bedding plants, is 65 deg. of bottom heat, indicated by a thermometer plunged in the sand, and an atmospheric temperature of 15 deg. less. A range of 10 deg. may be allowed, that is, 5 deg. lower, or 5 deg. higher, but the nearer the heat of the sand can be kept to 65 deg., and that of the rest of the house, when the operation is performed, to 50 deg., the more perfect the success will be.

From the time the cuttings are inserted in the sand until they are rooted, they should never be allowed to get dry; in fact, our practice is to keep the sand soaked with water, being watered copiously every morning, and often, when the atmosphere is dry, again in the evening. Kept thus saturated, there is less chance of the cutting getting withered, either by heat from the sun's rays, or from fire-heat; for, be it remembered, that if a cutting once gets withered, its juices are expended, and it becomes in the condition of a hard cutting, in the condition in which, when bent, it will not snap nor break, which we have shewn to be the proper state at fig. 1. To avoid this withering or flagging of the cutting, every means that will present itself to the propagator is to be used. The practice is to shade and *give air* just as soon in the forenoon as the action of the sun's rays on the glass raises the temperature of the house to 65 deg. or 70 deg. This practice of giving air is, I am aware, not in very common use, many contending that the house should

at all times be kept close. I have tried both methods long enough and extensively enough to satisfy me beyond all question, that ventilating and propagating at a low temperature is capable of producing a larger quantity of stock during the season than at a high temperature and in a close atmosphere. There need be no failures, and it has the important advantage of producing a *healthy* stock, which the close or high temperature system would fail to do in the case of many plants.

I am of the opinion that permitting a moderate circulation of air in the propagating house tends to prevent the germination of that peculiar spider-web-like substance, which every one who has had any experience in propagating knows the baneful effects of; and how, in one night, it will often sweep off thousands of cuttings that a few hours before were in healthful vigour. But this insidious enemy of the propagator requires, like vegetation of higher grades, conditions suitable to its development, which evidently are a calm atmosphere and a temperature above 55 deg. or 60 deg. Hence, to avoid this pest, we make every effort by shading, airing, and regulation of fire-heat, to keep the atmosphere of the house so that it shall not exceed 60 deg. This of course is not practicable when the outside temperature in the shade is above 60 deg.; but the temperature can be reduced considerably by dashing water on the pathways and other parts of the house.

The *shading* of the glass, to prevent the temperature from rising in the house, is done in various ways, some using canvas, or bast-matting, or painting the glass with lime or whitewash. I find the cheapest and most convenient shading to be that formed by screens made of common lath, nailed an inch apart to a frame the size of the sash. This gives an ever-varying, modified shade, sufficiently cooling to the house, yet not darkening the cutting enough to impair its vigour. These are not put on in the morning until the temperature inside indicates it to be necessary, and are taken off in the afternoon as soon as the sun ceases to shine on the glass; for it is of the utmost importance that the

receive as much light as they will without becoming withered. Cuttings too much shade, and at a high fire, are drawn up weakly, and this to recover from the injury done judicious treatment. The time for cuttings to root varies from 5 to 10 according to the variety, condition of soil, and temperature. Verbenas, and heliotropes, put in in proper condition kept without ever being allowed will root, in an average bottom heat of 50°, in eight days, while roses, pelargoniums or petunias, will take at least double time under the same conditions.

One point of importance, and one too neglected, is to pot off the cuttings as soon as rooted, no matter how small the plant be; half an inch is a much better size than one; and when potted they will be better than two. The operation is much more easily performed when the roots are short and young. But the main evils of detaching cuttings are, that too long the cuttings grow up weak and flaccid; the roots, which become woody, do not strike freely into the soil; the care is required in shading and after potting, and the plant usually loses its lower leaves, weakening its vitality, and subjecting it to a greater chance of failure. With but few exceptions, cuttings should never be potted into pots exceeding 4 inches in diameter; the infant plant in its early state has as yet but limited vitality, and should not be gorged with food. The soil should be sifted fine, through a sieve with a mesh something less than one-quarter of an inch in diameter. Thus fine, it is more agreeable to the roots, delicate as yet, and it is more easily and quickly used in the operation of potting. After potting, they should be set on a shelf covered with an inch of sand, and freely watered with a watering-pot, and for two or three days should be kept exactly, in shading and watering—they were yet in the propagating house at this stage they are allowed to dry in drying, or excess of heat, feeble

and sickly plants will be the result. The preceding method is that in use in most of the large florists' establishments, and is applicable wherever there are regular propagating and plant houses; but as there are hundreds of villa gardens having, perhaps, only one greenhouse, and thousands who have no greenhouse at all, who would gladly know how to increase their plants, to these we can detail a simple method, yet one equally effective and safe. I shall call it

THE "SAUCER SYSTEM" OF PROPAGATING,

because saucers or plates are used to hold the sand in which the cuttings are placed. This sand is put in to the depth of an inch or so, and the cuttings inserted in it close enough to touch each other; the sand is then watered until it becomes in the condition of mud, and placed on the shelf of the greenhouse, or in the window-sill of the sitting-room or parlour, fully exposed to the sun, and never shaded. But one condition is essential to success,—until the cuttings become rooted, *the sand must be kept continually saturated, and kept in the condition of mud*; if once allowed to dry up, exposed to the sun as they are, the cuttings will quickly wither, and the whole operation will be defeated. The rules previously laid down for the proper condition of the cuttings are the same in this case, and those for the temperature nearly so; although, by the saucer system, a higher temperature can be maintained without injury, as the cuttings are in reality placed in water, and will not droop at the same temperature as if the sand was kept in the regular condition of moisture maintained in the propagating house. Still the detached slip, until rooted, will not endure a continuation of excessive heat, so that we advise, as we do in the regular method of propagating, that the attempt should not be made to root cuttings in this way in the months of June, July, or August, unless with plants of a tropical nature. When the cuttings are rooted, they should be potted in small pots, and treated carefully by shading and watering for a few days, as previously directed.—*Peter Henderson.*

CULTURE OF THE CYCLAMEN.

THE furnishing of the greenhouse or conservatory during the dull winter months is at all times a source of considerable care and anxiety to all gardeners and amateurs who take real pleasure in their work. In the bright summer months, when flower gardens are all ablaze with parti-coloured ribbon and chain borders, and all the other devices which the ingenuity of the gardener can conceive, and which modern flower gardening demands, the importance of having a great display in-doors is considerably lessened; and it is well in many cases that it is so, as it affords to all those whose accommodation and appliances are on a limited scale, an opportunity of improving their stock, and strengthening their forces for the winter campaign. The hands of those who are called upon to cater for the requirements of their employers, or who indulge in

most lovely and useful among winter blooming plants; and, although old and well known, has unfortunately been allowed to remain in a great manner neglected until comparatively recent years; but the chaste beauty of the inflorescence, supported as it is in some of the varieties with prettily variegated foliage, is at last gaining a place in public favour; and we may anticipate that their cultivation will continue to extend as the efforts of breeders are from time to time rewarded with new and improved forms. Much has already been effected in that direction; and the increasing popularity of the flower will doubtless act as an incentive to those who have turned their attention to that object. By growing a few of the different varieties, such as Neapolitanum, coum, Europæum, Atkinsii, and Persicum, a continuity of blooms may be had from October till April; and as they require but a very moderate amount of accommodation and attention, they are essentially winter flowering plants for the million.

The seed, from which alone they can be propagated, comes freely under proper management, and ought to be sown in February or March, in well-drained pots or shallow pans, filled with soil, consisting chiefly of leaf mould and sand. If plunged in a pit where they can have the benefit of gentle bottom heat, and at the same time be near the glass, they will soon germinate, if the seed be fresh and healthy. It is but a very short time since it was considered pretty good work to flower them the second or third year from sowing; but it would appear that their cultural requirements have become better understood than formerly, as it is now no uncommon thing to find them flowering ere being twelve months old. To succeed in this they must never be allowed to rest from the time they are sown, but should receive every encouragement in the way of pricking out the young plants as soon as fit to handle, and potting off into $2\frac{1}{2}$ or 3 inch pots as soon as it is necessary,



many times the size of the seedling. The young plants should be pricked out as soon as they are fit to handle, and potted off into $2\frac{1}{2}$ or 3 inch pots as soon as it is necessary,

open soil, and never allowing them
from want of water. Close attention
matters will, in most cases, be re-
with blooms the first year, or, at all
fine strong corms, ready to bear
ce of flowers the second year. After
year's growth is completed, they re-
ertain amount of rest in the summer
and here again the practice generally
differs essentially from that which
prevailed in too many cases. Then
o uncommon thing for the plants,
ering, to be placed on some dry shelf
ll blazing sun, in the same way as
s bulbs and some others are treated;
rience has proved it to be decidedly

injurious. A much better plan is to set
them in a cold frame in some shady situation,
so that they may be screened alike from
drenching rain and scorching sun. Towards
September they will again begin to grow, and
should then be repotted into pots proportion-
able to the abundance of roots, and will only
require heat enough to ward off severe frost.
Give, on all possible occasions, abundance of
fresh air.

So beautiful are all the varieties, that
even a novice can barely make a mistake
in selection ; though *Persicum*, in its various
colours, is perhaps the most generally useful,
as it is decidedly the most popular.—*J.*
Lorimer.

CHAPTER II.

Plants which will do for it—Choice of Flower Bulbs—
Hyacinths blooming under the Water—Disposition
of the Glasses for this experiment—Planting the Bulbs
—Hyacinths forced in Water—Jonquil—Crocus—
Van Thol Tulips—Flower Pots for the Garden on
the Mantel-piece—Care of the Bulbs after Flowering
—Separating the Tufts of Crocus—Hepaticas.

On this condition, there will be no disappointment for you, in the resources that your garden on the mantel-piece will afford.

By the end of September, the evenings begin to be cool; and a little fire is indispensable after sunset. It is now time to procure good roots of hyacinths, crocuses, Van Tholl tulips, and jonquils. You must not choose the largest among these bulbs, which are not always the best by a great deal; but those of medium size of their species—firm, smooth, shining, free from spots or bruises, and from softness. Those which give premature signs of vegetation ought not to be selected.

other. They are to be used as follows : Put into the one that is open at both ends one of the finest of your hyacinth roots ; suppose you take one of a fine red—a Sultan Solymán for instance : place this bulb in a position inverse to its natural position, that is, with the bottom up, and the top, from which the leaves and flowers are to come, downwards, even with the orifice at the bottom of the vase. Then you must crumble a mixture of good garden earth and leaf mould over the bulb until the vase is three-quarters full. A second bulb with a flower in strong contrast to the first, say a blue if the flower of the first is red, and *vice versa*, must be next placed in the vase, so that the top shall be even with the upper orifice. You have nothing more to do than to place the vase thus prepared upon the first vase full of water.

Two similar couples look very well, placed upon the two ends of the mantel-piece of a room in which people habitually sit, and where, consequently, fire is constantly made while the cold season lasts. The earth in the upper vase should be moderately watered as soon as the bulbs are placed in it, and be kept constantly moist, avoiding excess, but renewed watering whenever you perceive that the earth is getting dry.

At the end of two days, the crowns of the two bulbs will both send out straight, white roots; those of the reversed bulb turn downward curves, but do not fulfil their function—nor for that. Very soon the two bulbs are in a contrary position to each other, but forth leaves—the one into the air, the other in the water; then you will see appear in the midst of the transparent liquid the buds of the floral stalk, and finally the flowers, as well formed, of as rich a colour as those surrounded by leaves of as fine a green as the corresponding parts possess, of the other bulb planted in the ordinary manner, and vegetating and developing in the air, its natural element. It is true that time is nece

all this to be accomplished: bulbs in October will flower fully in February; but is it not a pleasure to watch day the phases of their development, all that of the hyacinth which ends by lying in the water, head downwards?

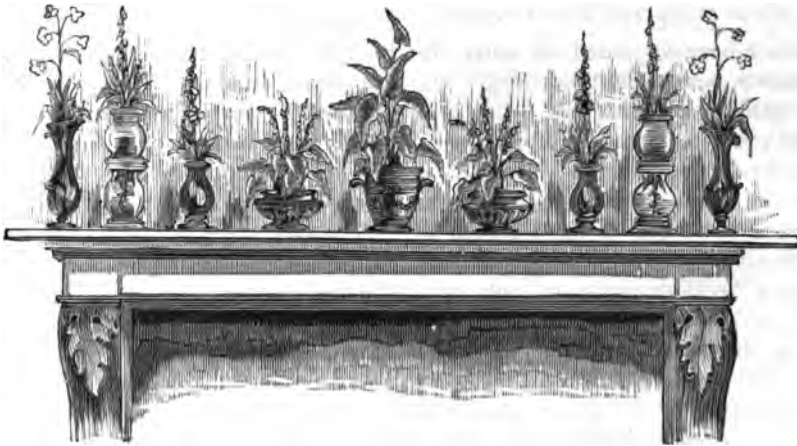
HYACINTHS FORCED IN WATER.

For these curious phenomena in vegetation being accomplished, you should rather hyacinth roots in bulb glasses, blue or colourless, of the form adapted for purpose, which you must not fail to instantly filled with water, so that the bulb be even with the crown—that is, the edge of the flat part of the bulb—never passing it. For filling these as for watering the earth where the

between the glasses containing the bulbous plants nourished by nothing but water, place pots full of earth, mixed half and half with garden manure; leaf mould would not be strong enough. Plant crocus bulbs in these, taking care to group in the same pot the very finest varieties of pure white, white striped with violet, and plain violet. The flowers of these plants, which precede the development of their leaves, contrast agreeably, by the vividness of their colours, with the pale yellow of the jonquil.

VAN THOL TULIPS.

Other pots like the first, and filled with the same mixture, must have in them roots of the Van Thol tulip, a charming little tulip with a dwarf stem and petals of a bright red



The Mantel-piece Garden.

Now one above the other, one upright other reversed, remember that you use only water of the temperature of room. Without this precaution you will fail, and the bloom of your bulbs will be miserable.

JONQUIL—CROCUS.

Roots of the jonquil should be treated like hyacinth roots—using pure water. You cannot count with certainty on the growth of all roots, it is prudent to put at once in the same glass, placing them in a thin, round piece of wood with holes cut in it. They bloom at the same time with the hyacinths. In the spaces

bordered with golden yellow. All these flowers develop at the same time, presenting a happy variety of forms and shades in the bloom of a mantel-piece garden, whilst Nature is at work without, preparing her more abundant supply of flowers in the open air.

FLOWER-POTS FOR THE MANTEL-PIECE GARDEN.

Whatever may be your taste for elegance, believe in the experience of an old gardener, and never plant your crocuses and Van Thol tulips on your mantel-piece in anything else than the ordinary earthenware flower-pots, which cost a few pence, varying in price according to their size. Conceal their roots

surfaces with coverings of glazed paper, folded and cut at their upper edge, and place under each pot a porcelain saucer; and this is the utmost extent you can be permitted to go in sacrifices to elegance. If you plant these poor bulbs in rich vases of varnished iron or porcelain, painted and gilt, they will languish, and your hopes will be completely deceived; for they will bloom badly, or not bloom at all. The porous nature of the ordinary earthenware flower-pots is perfectly well adapted to the vegetation of the roots of ornamental plants. If you place these roots in iron or porcelain, you will not obtain, however sedulous your care, any satisfactory result; no more in the garden on the mantel-piece than elsewhere.

CARE OF BULBS AFTER THE BLOOM IS OVER.

Bulbs which have vegetated in water do not necessarily perish after blooming. Do not wait until their leaves turn yellow and fade before you take them out of the water. When you have done this, the bulbs may be planted out in a warm corner out of doors to ripen—that is, if the grower has a garden in which to do so. If, however, the grower is in every sense a “parlour gardener” only, with not a foot of ground outside, the best plan after taking the bulbs out of the water will be to let them drip well; cut off the fibrous roots, the leaves, and the flower stalk, and place them in a drawer where they will be protected from moisture. The next year, those which have not turned soft should be planted in earth, and placed on the window sill, out in the open air, that they may recover if they have strength enough to do so, or to give offsets or young bulbs to replace them in time. The bulbs which were planted in earth will not have to be treated in any manner from having been in the water. The mantle-piece garden, for the purpose of forcing crocuses, is a most convenient one, and it is a great advantage to have a few of these bulbs in it. The bulbs which have been in the water, and which have not turned soft, should be planted in earth, and placed on the window sill, out in the open air, that they may recover if they have strength enough to do so, or to give offsets or young bulbs to replace them in time. The bulbs which were planted in earth will not have to be treated in any manner from having been in the water. The mantle-piece garden, for the purpose of forcing crocuses, is a most convenient one, and it is a great advantage to have a few of these bulbs in it.

If you like crocuses—and if you do not, you are too hard to please, for there is not a spring flowering plant fresher or prettier than the crocus—you must continue to water them after the bloom. Their leaves, of a fine green, marked throughout their length with a white line, will not be amiss as part of the decoration of your mantel-piece garden. When the leaves begin to turn yellow, you must cease entirely to water them; but you must not take up the crocus roots. They must be left in the dry earth until next year. They will keep there very well, surrounded by their young family; for they produce every year a certain number of little ones, which will bloom in their first spring. These bulbs ought only to be taken up every three years, and then for the purpose of separating the clusters; without which the pots would be too full, there would not be nourishment for the whole family. When managed in this manner, the tufts of forced crocuses are more beautiful the second year than the first, and still more beautiful the third year; after which you must renew the plantings.

The very easy gardening, of which we have just described the process, will bring you to the fine weather; and then, if you go to the country to pass the summer, the mantel-piece may remain widowed of its garden until autumn. But if you remain, you may put upon the mantel-piece some of your prettiest flowers whenever you have too many for your balcony. They will there require attentions of which we will tell you when describing the garden at the window.

HEPATICAS.

Has your mantel-piece room enough to admit of two or three supplementary pots? Then put there, rose-coloured and blue hepaticas, which are charming in form and colour, but have no perfume. With these resources there is abundant material to give you a taste for the culture of flowers in the mantel-piece garden. The hepaticas are flowers of a most accommodating disposition; nothing more is necessary to them than half a glass of water every two days, and for the temperature of your chamber to be such as suits yourself.

Work in the Garden during June.

From "THE VILLA GARDENER."

NE comes to us dyed deep with rose-blushes, and heavily freighted with many-coloured, d-form beauty. Summer has now opened wide portals, and June comes forth the Queen of the —crowned with a diadem of roses, and passing e our enchanted eyes, nearly ankle deep in floral nness and beauty. The Month is clothed from to foot—from beginning to end—with the best brightest from Nature's great wardrobe of lovely s, and fringed with the most exquisitely sweet graceful pendants—wreaths of woodbine and jessa-, and climbing roses. Back again to roses, you Well, June and Roses come in circle. It seems st a pity that one should have to write of aught e in June, or, indeed, have to write or read at The month ought to be given up to the enjoy- of the rose. So tend—guard—nourish and r it—is a pleasure fit for gods. There is the pretty of its origin to muse upon, while we fondle and r it for the month.

"When Cytherea, naked, to the light
Waked from her Neptunian birth,
To fill with love the circling earth;
Then, then, in strange eventful hours,
The earth produced an infant flower.
By chance upon a blooming thorn—
Such as the heavenly halls adorn—
Some nectar drops, in ruby tide,
Its sweetly orient buds had dyed:
The gods beheld this brilliant birth,
And hailed the rose—the boon of earth;
They bade them bloom—the flowers divine—
Of him who shed the teeming horn;
d bade them on the spangled thorn,
Expose their bosoms to the morn!"

the presence of the Queen of Roses, your garden ld rise to its highest level of culture and of ing. Were her gracious Majesty, our well-ved Queen, to pay any of our gardens a visit, what tter of preparation there would be! How anxious y reader would feel to have his or her villa garden, gh small, put perfect in style, keeping, and fur- ing for such a distinguished visitor. Now, with- lisloyalty, it may be affirmed of every garden that ater than Victoria is or will be there. Let us at ee to it, then, that our gardens are made worthy er presence; and that everything that mars or es them is taken away before she comes to crown 1 with beauty, and sweeten them with her fra-

grance, which seems the very breath of heaven. All should be happiness this month, for now the garden spreads its feast of roses. May our readers thoroughly enjoy the feast, while they attend to the following matters! Then the doings in the garden in June will deepen their devotion to the Queen of Flowers.

KITCHEN GARDEN.

Peas.—Make another sowing of Veitch's Perfection, Ne Plus Ultra, or British Queen. These are tall peas of the finest quality. The ground should be very richly manured, and for these late crops it is best to sow the peas in shallow trenches, say 6 inches below the surface, after the seed is covered. This renders the watering of them with sewage or manure water, which will be needful in dry weather, an easy matter. In smaller gardens, or where there is a difficulty in procuring stakes, the following shorter peas, ranging from 1½ to 3 feet only, may be sown instead:—Advancer, Princess Royal, and Harrison's Alliance. These are also first-rate peas. Earth up, stake, gather, and water advancing crops. If you wish to gather a long time from a few rows of peas, never allow any seed to ripen. Gather young if you wish to know the sweetness of really good green peas, that is, when the peas are about one-third grown. Many villa gardeners seem not to know when to gather such vegetables. It is no uncommon thing to meet with peas positively hard at villa tables, and broad beans with even black eyes. In the latter condition, broad beans are only fit food for horses or pigs. Another point about pea-gathering is, if possible, to pick all the pods about one age, and all of one variety. There are great differences of flavour in different peas; and, more important still in this connexion, they vary much in the time required for cooking. One sort will cook to perfection in 15 minutes, while another needs 20. Perhaps the two are mixed—one is spoiled, or underdone. It is even worse if peas vary much in age or size. The youngest are ruined before the oldest are half done. In gathering each dish of peas, remember the three simple rules—all of one size—the same age—and of one sort. This, with careful shelling as soon as they are gathered, plenty of water, a spoonful of sugar, 6 sprigs of mint, careful boiling, and instant serving, will ensure peas on a dinner table of each villa fit for a duke.

Beans.—The same rules for gathering, cooking, &c., are applicable to broad beans and French beans. The latter are often uneatable at table from being too old.

or carelessly managed in the kitchen. The simplest rule for gathering these is to reject all that will not break quite crisply asunder into two separate halves. If the inner lining or membrane of the pod has acquired sufficient toughness or consistency to prevent the pod separating when broken across, the bean is too old to eat. In preparing, the ends are snipped and one dragged up the front and the other along the back of the bean. In beans so prepared there are no troublesome encumbrances, nor stringiness to be found. They are sweet, crisp, juicy—in fact, perfect.

Make another planting of Broad and French beans. The Black Negro is most liked for pickling. It is long, slim, and delicate.

Sow lettuces, endive, cauliflower, Walcheren and the latest spring brocoli; spinach, turnips, celery, mustard, cress, radishes, and a few carrots for dressing young, garnishing, &c.

During such hot weather as we frequently have in June, it is best to sow lettuce where they are to remain, as those transplanted in hot weather often causes them to run to seed. Radishes should be grown in a shady place, otherwise the intense heat will make them hard and stringy. A few onions should likewise be sown, where such relishes are enjoyed raw in a small green state. Finish thinning the main crop; top-dress, with slight sprinkling of guano or soot, and a pinch of salt in showery weather. Keep the surface clear of weeds, and broken about an inch deep by the hoe.

Plant out cauliflower—prick off succession crops. Cauliflower should be planted in rows 2 feet apart, and the plants 18 inches asunder. Water at planting and do not allow the plants to flag. Cut early cauliflower. During hot weather it is a good plan to have two or three large leaves over these two or three days before planting. This prevents the sun stealing away their sweet juices, and preserves them white as snow.

Plant out borecole or kale, Brussels sprouts, savoy, and brocoli at the same distances as cauliflower, and treat in the same way in regard to watering, &c. Where ground is scarce, as in villa gardens, all these crops may be planted in the furrows between early potatoes. There they will get established, and by the time the potatoes are taken up the brocoli will need earthing up, and the two processes can be done at once. As the potato ridge is levelled, the brocoli furrow will be filled in and the stems thus earthed up. In adopting this mode of simultaneous double cropping—that is, two crops on the same ground at the same time—care must be exercised to see that the advancing crop has justice. For instance, should a potato branch and a brocoli leaf struggle for the same modicum of blue sky, the potato leaf must be sacrificed. Welcome the coming and speed the parting guest, is a rule of universal application to all simultaneous cropping. Should, however, the rule be applied to brocoli, kale, sprouts, &c., will be too late, as they must be gathered after the removal of the first

Plant out leeks and water freely in dry weather; thin parsnips, carrots, turnips, beet, and all growing crops that require it. Let it be done as early in all cases as the young plants can be fairly handled. Overcrowding means weakness of plant and loss of time. It seems otherwise to the tyro. Look at those rows of carrots as samples, that have just been thinned. Compare them with the unthinned. How much stronger the latter looks. But the apparent strength comes from the aggregate of numbers alone. Weakness presented to the eye in crowds fills it with bulk. But in success in the culture of garden stuff comes from the power of individual merits, and this power can only be developed to the utmost when each plant has from its earliest stages room to live and breathe, and have its being. Early thinning and thorough, that is, giving each plant room enough is the great secret of growing garden vegetables, and plenty of them.

Celery.—Plant out for succession. Indeed, the main crop is mostly planted this month. The plants should be carefully lifted with a trowel, leaving a nice little lump of earth, and roots quite undisturbed. Plant it carefully in trenches and literally wash it into its new quarters. It cannot have too much water on good soils. Remember, this celery is a semi-aquatic plant—a native of ditches, estuaries, morasses. Therefore see that from birth onwards it never suffers for the want of water. It must never flag, nor indeed know what thirst is. It will grow even when dry; but not with crispness nor sweetness. It will cease to lay on crisp cellular tissue and run up into seed; so when you go to take up your celery, instead of a solid compact stick sweetly grown, you will find a seed stem about as tough as a walking cane engaged in forming a flower by way of handle. Next month we hope to offer a sure and certain recipe for having bad celery. For the present I leave our readers these two injunctions, give plenty of water and no earth.

Plant out vegetable marrows, ridge cucumbers, tomatoes, and chilies or capsicums, where they are grown. Plants of these may readily be purchased of nurserymen or market gardeners, and they should find a warm nook or corner in most villa gardens. They do well on walls, or under hand lights, Cloches or Rendle's Protectors, for a time, and then allowed to scramble through, as they get large and strong, and shift for themselves in the open air. Tomato sauce is delicious, and cayenne pepper is employed by many. These may readily be grown on steep banks of earth with a south aspect. The plants of tomatoes may be set 2 feet apart, and the chilies one. Peg down the plants on the ground; keep these rather thin of leaves and branches; stop the shoots as soon as they shew a few bunches of fruit, and keep the plants rather dry till the fruit ripens.

Potatoes.—Hoe deeply among these to loosen the earth and destroy weeds. Leave the latter to wither up and die, and then earth up the stems of the pota-

toes. I have seen amateurs and others hoe up the weeds and earth at the same time. The result was to replant the weeds in new, soft earth to impart fresh strength, and give them a new lease of life.

Herbs.—Dress and keep herbs of all kinds. Plant out or sow summer savory, sweet or knotted marjoram, and sweet or bush basil; also, chervil and golden purslane, and common marigolds, when either are valued. The latter is much used by some for flavouring soups. It gives a unique flavour, and is said to be very wholesome. The flowers only are used. Before herbs come into flower, they should be cut and dried, rubbed down into fine dust, and stored away in closely sealed bottles. The rich aroma is thus preserved, and the herb essence is kept clean and handy for use. It is a good plan to keep the different kinds of herbs in one place; have, in fact, a garden of herbs, however small. Sage, thyme, lemon or golden thyme, fennel, tarragon, mint, penny-royal, hyssop, the winter savory, and marjoram; and above and more than all, plenty of extra curled parsley should be grown in every garden. In addition to the sweet or savoury, the following semi-medicinal herbs find a place in most gardens—Rue, rosemary, horehound, lavender, camomile, balm, and peppermint. Those fond of wine cups as a cool summer drink, should also sow or plant at once a small bed of borage. This is an annual, and must be sown afresh every year. A beautiful sweet, of a most peculiar flavour, is made for the dessert by candying the leaf stalk in a green state of that most noble and right regal herb, angelica. This furnishing of the herb garden ought to have been done in April, but better late than never; only the penalty of this lateness must be paid in abundance of water, else the herbs moved now will die. Perhaps having provided for you in this department plenty to eat, it will be wise for you to buy your flavourings at the greengrocer's this year, and go into business in the herb line next spring. The secret of good cooking is abundance of relishes, green or dry; and in skilful hands even a dinner of herbs is not the starvation regimen that it is mostly accounted to be—very far from it.

THE FRUIT GARDEN.

Attend to last month's instructions, and see that the prescribed work has been done. The buds will now have got out of reach of the birds, but they will now be on the outlook for half, or wholly ripe cherries and strawberries. All these must be carefully guarded from their ravages. Cherries must be netted long before they are ripe where birds are plentiful. The sight of a cherry seems to affect birds as red-cheeked apples do school-boys. Neither can rest till they get at them. Before netting see that the trees are clear. It is the best plan not to nail in the shoots of cherries at present. They keep out the nets from the trees and thus prevent the birds carrying the fruit off by a ruse. If the shoots are nailed in, and no other means employed to keep the nets out from the wall, the birds

come with full force against it with open distended bill—make a dash at the cherry through the net and carry it off in triumph. Keep the shoots clear of black fly, or cut off their top ends when the fly—as is often the case—is confined to these. Collect the infected shoots and burn them at once.

Apricots.—Thin the fruit, and use it for tarts or preserving in bottles wholly. These also make a very peculiarly sweet preserve. But they require much sugar, and seem at best a good deal like prussic acid, sweetened into palatableness. As a preserve, I don't think them worth their salt—sugar, I mean. Stop vigorous shoots, and lay in any that room can be found for. Stop heart wood back to three or four eyes. The apricot bears mostly on the spur of the old wood, and likewise on the young of one or more years' growth, like, though not to the same extent, the peach and nectarine. Plums produce fruit in very much the same style as the apricot, as the summer treatment may be identical, only laying in as a rule more young scions in the plum than in the apricot.

Peaches and Nectarines.—The treatment and mode of bearing fruit in these two are identical, and whatever is said of one, where one only is named, is true of the other. They bear entirely on wood of the previous year's growth, and therefore the great object to be aimed at in the furnishing of such trees, either in summer or winter, is the providing of young wood in sufficient quantity and of ample strength for fruit bearing, for in healthy trees there is never any difficulty about the quantity. Sometimes more than enough and to spare is sure to offer itself. These are removed by disbudding, as it is called. It ought, however, to be termed dis-shooting, for the operation consists in the entire removal of a shoot not of a bud. I don't approve of lateral disbudding out of doors. Let the buds all break into shoot first, to waken up the roots and give us our pick of buds. But having got rid of our excess, the next point in summer pruning is the regulation and distribution of the remainder. The object aimed at is to have the tree furnished with wood equally all over of about the same size and strength. There is a common saying full of meaning, compacting nearly the whole theory of pruning and training into a nut-shell:—"Furnish the bottom of the trees well with wood, and the top will take care of itself." This is as true of each branch or branchlet as of the tree in the grove. It furnishes the key to the best practice of summer pruning. In every shoot removed, laid in, or stopped, have an eye to a succession at your base lines. Choose each shoot reserved as low down on the branch as possible, and stop strong shoots boldly back. They will break into three or four of moderate dimensions: choose and retain as many of these as you can find room for, tie or nail them in, and in the autumn you will have several moderate sized shoots, well ripened, studded with flower buds, instead of one green fishing rod fit only for the flowers. It is good practice to nail in, or even bend down strong shoots and to elevate weak

ones, or, better still, allow them to grow freely and untrained from the walls. It is wonderful how such minute differences in position affects the flow of the sap in force and volume, and tends to its uniform diffusion over every portion of the tree. Keep the trees free from insects. Water heavily overhead with the engine in the afternoons or evenings of hot days: this refreshes the trees and keeps them clean. The heavy showers will also nourish the thirsty roots. When the trees are heavily laden, and the weather continues dry, the roots must likewise be watered thoroughly through the whole mass of earth with delugings of sewage or liquid manures. This will fill the tree with new vigour, and enable it to carry its load of luscious treasure without cracking it at the storing period. Remove all deformed badly placed fruit, thin out clustered masses, but leave the final thinning until the stoning is completed. When the stone is hard enough to resist the knife in cutting the fruit in halves, then reduce the number of fruit to a fair crop. One fruit every six inches is a full crop. Where the trees are very strong, they will bear this or more. But beware of excess on weak trees, and remember that what you gain in number you are apt to lose in size.

Apples and Pears.—Remove or stop any misplaced shoots; thin the fruit. Pinch back, towards the end of the month, all the shoots not needed to enlarge the trees.

Figs.—Will require to have weak shoots removed, and in very warm situations, a second crop may be gathered by stopping all the shoots back to three leaves. But this second crop, in the open air, is impossible in a general way, and therefore the shoots should not be stopped.

Vines.—Stop the strong side-shoots, remove the weaker ones. Cut out all the smallest bunches. Tie or nail the leading shoots or young buds required for successional bearing rod as it grows.

Gooseberry and Currants on walls or espaliers must have their leading shoots tied in to prevent them being broken by the wind.

Strawberries require considerable attention this month, and will be sure to receive it, too, as the eating season approaches. But the quality and quantity gathered will depend very much on certain preliminary matters that should now be seen to at once. The first is a thorough soaking or two with sewage or liquid manure water. The plants should be irrigated with this without allowing it to touch flower or fruit. Then about a week before they are ripe, give them a thorough watering overhead with soft clear water. The next day scarify the surface with a hoe, and cover with a layer of new tan or litter and water. You will find your strawberries as you gather them before, so full of juice, so rich in quantity, and all clean and unsoiled. A row or two should be pushed a-head of the others by covering them with Rendell's Protector. Forced strawberry

plants may still be planted in rich soil, carefully cultured and watered, and they will yield a crop in the autumn. Alpines should have all their flowers picked off, which will cause them to fruit freely when most wanted—and that is after all other strawberries have disappeared. There is every prospect of a wonderful fruit crop this season. We must thin the fruit freely, and nourish the trees generously, lest their harvest of plenty to us, bring the reaper's death to themselves.

THE FLOWER GARDEN.

Yes, it is something like a flower garden now, is it not? Ablaze with beauty set in colours of every hue, and wreathed round with greens of every possible tint and shade. But I must not rapturize, but instruct while doing the Work for the Month.

Roses.—"Within the petals of each rose, a sleeping love I espied." But what's that in yonder bud? A gnawing worm, I declare! It has eaten out its heart. Was there ever such cruelty to a rose—such disappointment to a rose grower? That bud too, above all others, of Charles Lefebvre—the best rose. This one, I do believe, the best bud on the rose. "It is ever thus—it is ever thus—the best the first to leave us." No, not always. But, see! look over these roses. Observe here and there you see a curled or a twisted leaf. "Yes, oh, yes." Well, in every one of these you will find a grub coiled up, within or near at hand; and by going over your roses carefully every day, or twice a-day for a time, and killing every one of them, you will be rid of your bud-eaters. Hand picking, a quick eye and nimble fingers, is my recipe for the rose grub. In these searchings, sometimes you will meet with the grubs or caterpillar on his excursions. But this needs a sharp eye, for though he is large, he takes his colour from his food, and is so like a rose leaf, that you can hardly see the difference. And this is greenfly. The best remedy is robust health and copious waterings in dry weather. Should these not prevent it, then dash overhead with quassia tea, or a decoction of smelling-salts. I cannot allow tobacco water, or even Gishurst's Compound, among roses in flower. Remove all suckers, support any shoot or branch that is in danger from winds; cut off any excess of wood of climbing roses, that their blossoms may be seen; and carefully pick up the litter made by falling rose leaves. It seems almost an insult to add—keep the roses clean, and all round them as bright and beautiful as themselves, so that no jarring note may be heard, felt rather, amid our full-toned enjoyment. The business of the Month is to enjoy, select, and bud roses.

We have given the routine work, and must refer the reader to other articles in THE VILLA GARDENER for these weightier matters.

June is often a somewhat trying month for the flower garden. Burning sunshine, without a cloud, from day to day, and from week to week, is not the most favourable condition for free and rapid growth.

is the one thing that is wanted for turned out into the flower-garden. Satisfast of roses, we must be quite content other beauties. But bedded-out plants the rose or scarlet fever at once. No they transferred from their narrow homes wider, richer world—the open bed—than to wake up, and look about them. ink, purple, yellow, orange, blue, t up from green tufts of leaves in is. The whole strength of the plants is l and expended upon blossoms. Unfortunately the plants flower the less they grow; ten happens, that at the end of June the it little or any better filled with plants than beginning of it. There are two remedies k of growth in June. The first is to ge plants, and place them so close together lants shall have nothing else to do but first to last. Where storing space, or gs prevent this instantaneous mode ng, the next best mode is to pick rly flowers altogether. Shall we have iums, calceolarias, verbenas, &c., in we have plenty of other flowers? or shall m in full perfection when others fade or vote for the latter, and therefore advise a her than a flowering regimen for the flower- ine. Water copiously late in the afternoon ; stake firmly, peg down, and train neatly; ig growth cannot be had without it, pick on of the flowers, and never allow any oduce seed. owing asters, phloxes, marigolds, zinnias, e stakes. Stake, transplant, and thin the hlias, hollyhocks, and other strong growing ater all such things abundantly in dry Large-leaved sub-tropical plants will need king in exposed localities. Carnations, d pinks, will require careful training. The lld be thinned according to the size and he plants, with the number of buds reduced. he fewer flower stems left, the fewer the l be. The quality may also be greatly y manure-water. Pipings of pinks should during the month. I keep them close moist under a glass frame, hand-light, Rendle's Protector. Plant out pansy seed- ttings in a shady situation for a late bloom. best seedlings, and throw away worthless ter, and put in more cuttings. Put in double-stock, wallflower, rockets, or any rial or perennial plants. Divide and rets, aubretias, forget-me-nots, rabis, pri- anthuses, auriculas, and all such plants that in quantities. Harvest and carefully store uses, anemones, hyacinths, tulips, &c., as die down. Dry them gradually in the store away carefully when dry, beyond the sharp teeth of rats and mice.

L. IV.

Choice polyanthuses and auriculas, in pots, should be placed for the summer on a north border. Gather seeds when ripe, and sow at once. Also, sow Brompton and intermediate stocks. And see that all tender annuals, and tender bedding plants, such as coleuses, &c., are all placed in their summer quarters. Cleanliness, strong healthy growth, and as much flower as possible consistent with strength and permanency, should be the rules for June flower-gardening in all villas. Weeds, untidiness, or dirt in June ought to be as rare in gardens as snow at mid-summer.

PITS AND FRAMES.

If such structures are devoted to cucumbers or melons, we have little to add to the instructions given last month, as to stopping, thinning, and watering. On cucumbers there is a danger of allowing too much fruit to swell off at once. Unless the plant is very strong, six at a time will prove a sufficient load. And see that others are coming on to succeed these, when cut, as succession of fruit, and not gluts, provokingly sandwiched with blanks, is what should be aimed at. This is easily managed if the plants are stopped at each leaf. From the axil of each a fresh lot of fruit springs forth. By thinning, selecting, and starting with care, and never overburdening so as to exhaust the plants, cucumbers may be cut from the same plants once or twice a week for six months. Of course such liberal reaping must be made up to the plants by liberal sowings of manure over their roots. Melons cannot be easily made to fruit continuously; and it will be wiser for the villa gardener not to try it. Be content with one crop, and see that the fruit have the benefit of all the sunlight, whether it falls upon the plant from heaven, or comes like a full tide of vital force—that is sun force to them through the ministry of the plant. To this end, all superfluous and lateral growth should be stopped, and only those parts of the plants nourished, fed, and extended, that are tributary to the nourishment, enlargement, and ripening of the fruit.

But possibly the pits and frames may be devoted to flower growing or raising. They are admirable places to grow balsams, celosias, cockscombs, achimenes, or even gloxinias in. Also for the growing of such seeds as calceolarias, cinerarias, primulas, &c., for the growing of the young plants, or for shelter or winter blooming. Hollyhock cuttings may also be taken from the bottom of the shoots, struck in cold close pits this month, and grown into fine plants before the winter. These are also good places for growing late geraniums, fuchsias, Salvias, liliums, or other flowers for filling the Glass House with beauty in autumn or winter.

THE GLASS HOUSE.

What roses are to the outside, so your pellar- goniums are in-doors. This is their day—month n r —of power and glory. They tread upon the l s of

azaleas in large establishments where the Conservatory is often almost filled with one thing at a time, and gorgeous as the azaleas are, little is lost by the change from even them to geraniums 4 yards round smothered over with blossoms. And such flowers! They must be seen to be appreciated. No description can give a true idea of their beauty. No, you cannot—ought not—to grow such huge plants. One would fill your house, and you want a dozen or two at least, and a variety.—Quite right. And there is nothing to hinder you having it. Though within the range of this large family every shade of colour, form, shape, size, and fragrance, may be had. But fuchsias, at least, must be added to geraniums. No villa garden glass house could be furnished without these. They are as indispensable as geraniums. These will need training, shifting into larger pots, and some of them may yet be stopped, to make a succession of flowers. Camellias and azaleas,

heaths, and other things out of flower, may be removed to a shady, sheltered place out of doors, and this will make room for the advancing tops and spreading blossoms of such things as geraniums, fuchsias, petunias, &c. Give abundance of air; in fact, leave the sashes open night and day. Shade for a few hours about noon; remove any dying leaf and flower; water freely, and feed abundantly.

Keep climbers on the roof in order, allowing them, however, a great amount of liberty; trailing branches hanging down by accident, like the ringlet of the beauty that would not keep inside the cap at the bidding of her stern mistress, but would come out to air itself. And see that no insect is allowed to prey upon the beauty or destroy the health of leaf or flower. Only thus can the Glass House be brought up to the high level of the roses that are now blooming so sweetly in thousands of villa gardens.—F.

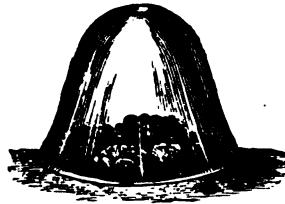
THE CLOCHE.

WHAT is a Cloche? A strong huge bell-glass, made of cheap but clear glass. Is it a newly contrived invention, or has it been practically tested? There never was an article introduced to the British public of which the merits have been more thoroughly proved by practical men; and although writers in gardening papers, anonymously and otherwise, have endeavoured to ridicule it, innocent of any practical knowledge of it, there is not a gardener in the United Kingdom who would not immediately adopt it, had he an opportunity of seeing what is effected by its aid. It is the cloche which enables the market gardeners of Paris to supply, not only that city, but the enormous demand of the London market, and various other great cities, with the tenderest and finest lettuces of various kinds that can be desired by the most exacting epicure.

In the winter and early spring months nearly every one of the small but well-cultivated market-gardens around Paris is half covered with them, while almost every French garden contains a number of them, from the small garden of the amateur, with a few dozen or score, to the large private garden, where they may be counted by hundreds. They are useful, not only in lettuce culture, but in various other important ways: in forwarding and protecting early and late crops, in seed-sowing, in propagation by cuttings, and, in fact, in ways too numerous to mention: whether in the dead of winter, we wish to preserve spotless the blossoms of the Christmas Rose; or in midsummer, when we may desire to raise under it seeds that otherwise would be in danger of being destroyed by birds or insects. When it is stated that the excellent propagators of Belgium and France use it in their houses for the rooting of huge and unwieldy cuttings of such subjects as *Ficus*es, &c., as well as the smaller tender plants, little more need be said by way of shewing its advantages in the in-door de-

partment. It is, in a word, far more handy and useful than the hand-light for the open garden, and quite equal to the most expensive large bell-glass for the hothouse, while it is infinitely less costly than either.

The more important advantages of cloches are—they never require any repairs, as do the hand-lights; they are strong, and with ordinary care, are seldom broken; they are easily cleaned (a brushing and rinsing in water once a year being all they require in that way), and they admit the full, clear light at all points. Usually the cloche is made without a knob, as that appendage renders the package much more difficult, and increases cost. On the Continent, practical men use only those without the knob, as in the specimen figured.

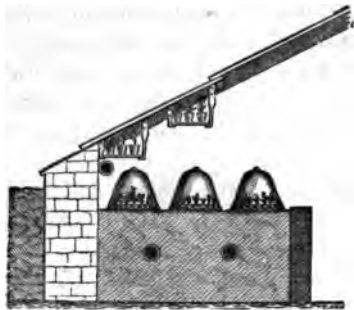


The Cloche without a Knob.

For in-door propagation, and for some purposes in the open garden, it would perhaps be an advantage if they were made with a hole in the top. This would supply a slight ventilation, and allow amateurs and lady-gardeners to move them about, without the slightest inconvenience, with one hand only. The ordinary knobless cloche is easily lifted, by placing one hand on the top and the other under the rim; and in conveying them from place to place, workmen in the market-gardens of Paris carry two or even three with each hand. In commencing to use them in our gardens it will be well to see that they are not placed in any spot where they will be in danger of breakage.

The cloche must not be confounded (as it has been of late by some of our writers on gardening) with the huge and

very dark bell-glass, which was in use many years ago in our market-gardens, and which may yet be seen here and there. I have recently been surprised to see that Mr D. T. Fish, in an article in the *Gardeners' Chronicle*, highly praising Rendle's Plant-Protector, says, with reference to the latter, "they have some special advantages over all other temporary shelters, such as cloches, &c." Mr Fish would, I am sure, if he saw the cloches in use round Paris in the early spring, regret that he has expressed such an opinion. On the one hand, we have an article which, for simplicity, cheapness, and utility, has been proved by the severest of all tests,—that of the market supply; and on the other, a complicated, not inexpensive, and



The Cloche used in the Propagating House.

comparatively untried contrivance. I of course speak of the two articles in relation to the phases of culture for which the cloche is generally employed, and not with reference to vine culture, &c. And with respect to the culture of lettuce, and the various other uses for which it is adapted and employed, it is no wiser to say that these plant-protectors surpass the cloche, than it would be to assert that a craft of china and glass, with muslin sails, is better adapted for catching herrings than the tough, tarry, and trusty old fishing tubs which have hitherto so successfully gathered for us the harvest of the sea.

From the garden of any size at the present

some of these glasses, which, I am glad to say, can now be procured cheaply in this country, thus avoiding the great risk of breakage involved in getting them from Paris. The Aire and Calder Glass Company now make them at their works at Castleton, near Normanton, in Yorkshire, and are ready to send them, safely packed in crates, to any part of the country. Visitors to London may also see them at the Company's offices. These cloches are in all respects equal to the French, if not superior; they are perfectly strong and clear, but scarcely so regular in outline as the Continental ones, sometimes being a little depressed at the top. This, however, in my opinion, is no real defect, and will doubtless be remedied as soon as the workmen get more used to their manufacture. The Company make them in several different sizes, but that which I would recommend is 16 inches in diameter, or the size of the one used so much on the Continent. The smaller cloches, however, will be very useful for propagating in-doors, and should be extensively used instead of the ordinary hot-house bell-glass, which is much more expensive. The price of these cloches is from 1s. to 1s. 6d. each, according to size, at the works in Yorkshire.

I should not attempt to go into these details, were I not certain that the cloche will prove a real and a most important gain to every amateur gardener; and that although common and cheap about Paris (they are sold there as low as 8d. each, or lower when bought in quantities of a thousand or so) it has hitherto been difficult, if not impossible, to procure them at a reasonable price in this country.

About the value of the cloche for protection purposes there cannot be a shadow of doubt; its cheapness, too, is an additional commendation in its favour.—*William Robinson.*

The Stable.

VETERINARY JURISPRUDENCE.

By JOSEPH GANGE, Sen.

A TRIAL for breach of warranty of a horse took place at Lincoln on 14th March last, which will be found reported at the end of this paper (page 521), and which is considered to be of sufficient importance to farmers and others engaged in the breeding and sale of horses, to merit notice.

It is notorious among men of long experience in the matter, that horse causes have been on the increase during the last forty years, and that they have become proportionately disreputable through the conflicting state of the evidence, and scandals raised by the contending parties.

That these actions frequently prove ruinous to the parties involved, and demoralizing to almost all who are engaged in them, few will deny; and fair-dealing men often suffer persecution and exposure to slander rather than encounter the certainty of annoyance, and uncertainty of the issue. Wise men abstain from being drawn into courts, to settle disputes about horse transactions. If, then, these propositions be undeniable, the obvious requirement is to devise some means to make the process of sale and transfer of horses less cumbrous, and, once done, more fixed than under present customs.

The case above referred to, *Mason v. Welfit*, was one of the ordinary kind, but was exceptional in its issue: verdict for the defendant—the seller. Whereas, in almost the whole of such cases, however inconsistent it may appear, the verdict is given to the other side. Not only is it made to appear that the seller of a horse must answer for the soundness of mind of the purchaser for many months after the transaction, but for the honesty and competency of all who have charge of him for the same time. So few

and far between have been the cases in which the decisions have been so thoroughly in accordance with equity and good sense as the above, that the writer can only recall to mind one, and, remarkable to say, that was also decided at Lincoln. I will therefore place on record a few of the leading features of the case, which happened ten or twelve years ago—writing from memory only—side by side with the recent case now reported.

The subject of dispute in the former case was a horse bought of a farmer, a tenant of the late Sir Tatton Sykes. The horse had been sold and delivered sound, and a warranty given, and he was taken south. After some time had elapsed, intimation reached the seller that he was unsound, and returnable, and restitution of the price was demanded, all of which of course were resisted; but more urgent notices came, backed by certificates from veterinary surgeons in London, and, finally, the imminent action was fixed to take place at Lincoln. At that juncture, a friend of the seller of the horse, an intelligent and upright man, who knew all about the transaction, and what was going on, rode over from Malton to the Yorkshire Wolds, to consult with and advise his neighbour under the trying circumstances, and accosting him, asked, "How are you prepared to meet thir host of witnesses now being prepared in London to be brought against you? Is Sir Tatton going up to Lincoln to speak for you?" "Oh, no," replied the honest tenant, "I cannot ask Sir Tatton to go so far at his advanced age." "Then," replied Mr N., "if you won't ask him, I will," and away he rode to Sledmere, stated the case to the baronet, who listened with much interest and concern, and inquired, "What can I do, John?" "V

Sir Tatton, if you go with us — will win the case, and save his honour; and without your testimony, who can speak to the goodness and sound state of the horse, he will lose the suit." "Well, then, I am sure I shall go," was the reply of the great and good man, then nearer ninety than eighty years of age. Accordingly, on the eve of the day fixed for the trial, the opposing parties met and were quartered in the same hotel at Lincoln. The plaintiff with his witnesses from the south, and the defendant with his select few supporters from Yorkshire. A long day's trial ensued. The veteran baronet was honoured with a distinct place in court, where he sat all day; when, as evening approached, and all other witnesses had been heard, Sir Tatton was asked to make his statement, which he did in such plain and convincing sentences, that all the previous depositions were eclipsed, and counted for nothing in the court, and the jury gave a verdict, in accordance, for the defendant; and the chop-fallen Londoners went back to their hotel quarters, with little relish for the dinner that was intended to have been a feast.

Two such decisions out of the common way do credit to the old county town where they were pronounced, the long interval that separated them notwithstanding. The sellers of horses are usually made to appear in the wrong at these trials, and are therefore, to the same extent, the persecuted parties; and many of the most respectable horse breeders prefer to sell to well-known buyers, and especially to foreigners, than run the hazard of bargaining with the first comer, whose money, when received, must be laid aside for an indefinite time before it can be known what a plea of breach of warranty may not be set up. This proposition may be better understood by reference to a case in which the result of a trial was the opposite of those quoted, and which may be regarded as a specimen, shewing the rule more than the exception.

Taking a case in which I can speak from observation, and familiarity with the most important details, such a one occurred about twenty years ago, and was tried at Edinburgh.

The subject of dispute was a brown gelding, reputed a good hunter, had belonged to His Grace the Duke of Buccleuch, and had been bought by a person living near Edinburgh, who—as the late learned Lord Brough, then Solicitor-General, succeeded in eliciting at the trial—was "not a horse dealer, but a gentleman who bought and sold horses." That gentleman effected a profitable sale of the horse to another gentleman, who took the animal along with the rest of his stud to hunt in Lincolnshire, where, it was shewn, the newly-purchased horse carried him well. Subsequently the horse was sold to a third gentleman, and taken as far northwards as the vicinity of Stockton, where he was found to be lame. He was then examined by a veterinary surgeon, and the conditions which gave rise to lameness were said to be chronic, and therefore the horse was returnable. Then ensued other examinations, all parties agreeing on the case. And finally, the horse was sent back to Edinburgh; and in default of the gentleman who sold him consenting to take him back, and refund the price, he was placed at a commission stable to be sold, in due time, and an action was raised. But as Cleveland and the rest of Yorkshire had been searched for professional witnesses to prove the case of one or other of the disputants, that process was renewed in Scotland, and, shortly before the trial, it came to the writer's turn to see the animal. On a frosty morning, with the roads covered with snow, a groom, accompanied by a clerk from the Repository, took the horse to the New Veterinary College, the Principal of which had already seen and pronounced an opinion on the case. But addressing himself to me, the person in charge said that it was requested I should have the horse's fore shoes taken off, pare the feet, re-apply the shoes, and certify, by writing, whether the horse had corns. I looked at the horse, and then at the men, and told them that I could only do part of what they requested, that I would take off the shoes, but would not promise to put them on again. Neither could I engage to pare away the hoof, already pared to the quick. The men answered, that, with such

s, I must do nothing. But they and debated, until one of them further instructions, and returned order, that I must do what was I accordingly shod the two fore that without paring away a par-oo, under pretext of exploration. m then mounted the horse, and we trotted upon the hard frozen roads, 'ent perfectly free from lameness. But id the mortification to be told by the groom, that they were ordered to er two veterinary surgeons on their he stable, to both of whom they give the same instructions—to re-shoes, pare the feet, and give cer-s to the presence of corns. A day afterwards, and before the auction place, I visited the stable to convince ether or not the threatened violence done, and I found that it had ; had been taken off, and altered, arther mutilated, and the horse was n pain.

trial, sixteen veterinary surgeons dence, and were equally di-numbers on the respective sides of tiff and defendant. Every fresh xamined increased the perplexity y ; and the judge, in summing up, that the witnesses were equally nd that Professor Dick, and Mr senior, were also on the opposite of different opinions. A verdict for the plaintiff, and the defendant ged to refund the balance of price, osts. Payment could not be made r was made bankrupt, and all the disreputable affair were losers vay.

orse warranty business forms an un-ource of evil and demoralization. ommon question asked, is, what ne to avert it? Very able lawyers : the law is good, but that the diffi-n its administration—bringing out

This admission seems tantamount ession that the law as it is, does ts purpose. It may be too refined icated for the rough-and-ready work

of every-day requirement. If it be so, then there is a case for legislation ; one which neither lawyers nor veterinary surgeons, or farriers, or any other body, can settle alone, or are likely to be agreed on. After considering the subject for many years, as it has presented itself to me under various phases in practice, I have come to recognize many of the most glaring faults in the customs, but can only venture to suggest few changes in the way of improvement. In fact, wherever the cause of evil is seen, the remedy seems to be easy and self-suggestive.

Assuming, as I do, that the common law which regulates ordinary sale and purchase transactions, provides equally for those of horses, the technical questions which come up respecting live stock, and those in connexion with horses in particular, as working animals, admit of restriction and simplification. A few suggestions, though not immediately called for, may in time come into use when the anomalous state of the law of warranty comes, as it will do, under public notice.

1. The period within which complaints should be lodged after the sale and delivery are effected, should be defined and restricted to twenty-one days, which I consider ample.

2. Matters of fact only should form grounds for legal action ; and no getting up of old stories of an animal having suffered from some ailment in past time, or in speculative notions that he may become affected by indefinite derangements, should be admitted as after resorts, though they be fair questions for purchasers to entertain and weigh when they are in treaty.

3. There are abuses of which the law at present takes no account, or at least are ignored by the public. Abstracting the temporary teeth of colts of the ages of two, three, and four years, is a common practice among breeders of the most expensive coach-horses in the kingdom, by which they are made to appear one or two years older than they really are, and therefore the purchaser requiring horses for almost immediate use, takes these tender young animals, call four- or five-year-olds, which lack a y

of the age represented, finds them utterly unfit for work, and is thereby doubly defrauded, because he attempts to obtain their service and fails, to the permanent injury of the animals, which are still more unfit for use than colts of their age properly managed, because to make a colt look like a mature horse bulk is wanted; and therefore they are forced up to size like prize oxen, at the expense of power and activity. This offence comes under the double category of wanton cruelty to the animals and the tendency to defraud.

4. I believe that, as veterinary surgeons, we have fallen into a growing habit of exceeding our proper sphere, *i.e.*, to speak to facts, regardless of questions of law; and in looking at a horse, to regard it as we do a man who is always considered honest and truthful till the contrary is proved. So with a horse, sound until proved otherwise. And no one is justified to attribute a defect, when discovered, to some concealed deception of months' standing, when a few hours might accomplish the development of the disorder.

5. The number of professional witnesses admitted into the court might, with advantage to all interests, be limited to one on each side, and a third as referee, to be nominated by the court. This would do away with a great deal of scandal, which tends, and rightly so, to lower the veterinary profession in the eyes of the public. There were three topics raised at the recent trial at Lincoln, which call for special notice.

The *de facto* plaintiff affirmed that "he thought he had the best weight-carrier in England until he was examined by the veterinary surgeons." We have here a positive starting point of the dispute—the most important, because all the subsequent incidents are due to it; and when that examination happened, the hon. gentleman had had the horse six months in his possession. Comment is needless, beyond remarking that it cost little to get involved in a suit and its consequences, compared with the sacrifices of various kinds to get out of it again.

Professor Spooner adduced two, theories devoid of facts to support them, in his deposition before the court. "There was rheu-

matic disease," he said. But that attempt to draw attention from the real, to fictitious conditions, was so well parried off, and dismissed by the jury, that no further notice of it is required. But Mr Spooner's next move was of a different tenor. "Splints," he said, "in nineteen cases out of twenty, are the result of constitutional disease." It is evident from the exposure, that Mr Spooner's knowledge of the nature of splints only reaches to that of the vague term by which certain phenomena are known. There is a queer aspect about these stereotyped numbers of proportion—nineteen to twenty—and the more remarkable when given on oath in a court of law—by the Principal of the veterinary school of the first horse country in the world. Exactness was perhaps aimed at, to be impressed on the jury, while there is not a word of truth in the sentence reproduced above.

There were not two men in the court probably, who understood the importance of the questions involved in Mr Spooner's propositions, or how much of newly-concocted matter there was added to old leaven, which, having been of slow growth, remained in times past almost inert. I will conclude my remarks on this incident by putting a question to Professor Spooner—What is a splint?

In conclusion, as a veterinary surgeon, I regard changes necessary, and as a buyer of horses, I regard them to be urgently called for; and besides, all buyers are, by turns, sellers, or transfer horses to third parties by engagement, and these instances give the most anxiety of all. Undoubtedly the sixteen members who, in the case above referred to, were called from all directions, for the questionable honour of being examined, regarded the assembling and determining the issue, on the principle of the ballot-box, as a privilege. But when a Lincolnshire jury twice affirms the principle of looking to the quality of evidence, and not the quantity, the reverse of the picture is seen. And still more conspicuous is the dark side shewn, when, as on the recent occasion, several gentlemen join together and travel all the way from London to Lincoln to be placed in such

liable position. All these displays only waste of time, but afford occasional diffusion of error.

HORSE WARRANTY.

MASON v. WELFIT.

Following is the report of the case on which my report is based:—

As an action to recover the sum of £268 for which Mr Mason, a large horse breeder, near London, gave Mr Welfit, of Lall, Lincolnshire, the sum of £300, the animal being warranted sound; but which, in fact, had to be sold at 48 gs., and it was found that it was not sound at the time of its sale by Mr Mason. Mr Field, Q.C., and Mr Wells were for the plaintiff; and Mr Overend, Q.C., for the defendant.

Mr Mason, the plaintiff, deposed:—“I had owned the horse twenty years. Bought the horse from Mr Welfit, when Mr Welfit said it was lame from its age. It was a sound horse, and they hunted him in the field. Rode him in the field. 300 guineas was the price that he gave for him. Left him with the horse, and he got rid of his lameness. On the 14th of August, I received a letter from Welfit saying the horse was in his mind.” On the 20th May, he was sent to be all right. Was taken care of, and on the 25th was sold to the Hon. Robert Grimstone, and taken into his stables, which were on his own premises. On the 12th August, he was put to put him in training for the hunting. At the end of the month it was found that he was lame, and everything was done to cure him; but when he was again exercised he fell lame. The horse was then out of town, and Welfit was

On the 17th October, on his return, he was to see him, and the horse was shewn to be lame. Welfit recommended a seton to be put in the frog, but Grimstone's groom did not take it. He was then examined by Mr Field, a veterinary surgeon, but he did not give a certificate, and sent to the college on the 5th November. Mr Spooner examined him, and the result was that the horse was sold at Tattersall's, and for 300 guineas.—By Mr Overend:—Welfit told me that the horse bruised his foot while hunting, and I took his shoe off. Galloped and ran in the field, but did not notice whether he was sound or not; but he was the first to come out of the stable. Did say to keep him till he was fit to show, and did not want a horse of that value in his hands to keep it till it was sound. The horse had a large knee, which had been fired, and had also been fired, and there was a mark on the fore leg. Cantered it when he got it, but he had done all he could to make it lame, and it never said that “Grimstone rode it

forty miles an hour, and was afraid he would break its neck before he came to the hurdle.” The horse was lame on the off leg in August. Could not say whether it was in the foot, and could not say that he had said it was in the foot, but it pointed its toes. Did not examine its foot. Paid for it on the 8th June, and saw Welfit twice between that and October, but never mentioned the horse's lameness to him. When he saw him in October, nothing was said about returning it to him then; not till after it had been examined. Then sent him a letter and the three certificates put in. The letter of Nov. 7 told Welfit he must return the horse, Grimstone having returned it to him. One certificate of Mr Cox's (Nov. 2) stated the horse to be suffering from defective action of knees and enlargement of the hocks, and another, dated the same day, gave a very different description of the disease. One of these was, however, given to Grimstone, and the other to him. Mr Spooner's certificate on the 5th of November said the horse was lame of both fore limbs, particularly the off one, and that the defective action arose from chronic rheumatic disease, associated with bony deposit on both limbs of long standing. One of Mr Cox's certificates applied to this horse; the other applied to another, which was also returned by him to Welfit.

Mr Grimstone, of Grosvenor Square, London, deposed—He cantered the horse up a hill and walked him. The ground was hard as a rock, and on which he declined to gallop him, but jumped it over a hurdle. Thought it sound, and bought it at £400. Saw the horse frequently during the summer, and used to take all his friends to see it, as he thought he had the best weight-carrying hunter in the country, until he was examined by the veterinary surgeons. His groom told him in August it was lame, but he thought it was only a trifling matter. Saw it again in October, and it was still lame. Saw Welfit on Sunday, 17th October, at Hendon, with plaintiff, and the latter told him the horse was still lame. Thought then it was lame in both legs. Welfit said, if the horse was his he should put a seton in his foot. Mason never said he had knocked the horse about on hard ground, and done all he could to lame it. When the horse was sold at Tattersall's, he bought it in again for the purpose of this action, in which he was the real plaintiff.—By Mr Overend—On the Sunday in question the opinion was the horse was lame in the feet.

James Frew, stud groom to Mr Grimstone for ten years, deposed—Began to walk the horse in August to put him in training, and at the end of the month noticed it was lame of the off fore foot, on which he took off his shoe and rested him. In three or four days it appeared quite sound, but on being exercised in the field again it shewed lameness again. The same thing occurred again and again. Blistered it round the coronets of the off fore foot, but without effect.—By Mr Overend—His hind shoes were off while in the stables. Always rode it himself, as it was a difficult horse to ride: it scampered about.

Mr Spooner, principal professor at the college, Camden Town, saw the horse on November 5, and examined it with reference to its limbs. Found it lame on both fore limbs, but particularly the off one. Observed various bony deposits on both, but especially so on the outer surface of the off knee. His feet were large, the soles flat, and the frogs prominent, and he came to the conclusion that the lameness existed in the knees and legs. The bony deposits arose from chronic rheumatism, and were plainly referable to rheumatic disease, and not to local circumstances. Splints, nineteen cases out of twenty, are the result of constitutional disease. They must have taken months, if not one or two years, to form, and this was confirmed by the firing. Believed there was a constitutional predisposition to the disease. The muscles of the shoulders were wasted, and the off one especially, which had existed for a considerable period.—By Mr Overend—The bony deposits might have formed since the time of sale. It was quite possible to hunt the horse without its shewing decided lameness. Did not think a horse with bony deposits could be hunted two years without shewing lameness. The bony protuberances were not inconsistent with an excrescence arising from a thorn in the knee two years ago. There were dozens of bony enlargements or splints on the legs.

William Pritchard, assistant professor at the College, gave similar evidence; believing the cause of the lameness to have existed with certainty twelve months.

John R. Cox, veterinary surgeon, Grosvenor Square, examined the horse on November 2. Found it very lame of the off fore limb, proceeding from general extensive diseases of the shoulder, of the knee, and the foot joints generally. It was the same disease (rheumatism) throughout, though of different dates. The bony deposit was on the knee and on the leg below. Felt confident the knee disease was of very long standing—long prior to March, and that it could not be a sound horse from that alone. The bony deposit of the foot was not of so old a character as the knee, but it might have existed prior to March, and probably did so. The deposits arose from inflammation from rheumatic tendencies. The muscles of the shoulders were flattened.—By Mr Overend—Could not say he mentioned "rheumatism" to Mason or Grimstone. Rheumatism would produce contraction of the hoofs. The protuberance on the skin would probably be the result of a blow, and if it was blistered, as he had seen, it would be reduced. The knee deposit might have been originally caused by a thorn, resulting in rheumatism.

Mr Field, veterinary surgeon, examined the horse on November 8, and gave evidence to the same effect. The bony excrescence on the knee was the cause of the lameness, which might be from accidental or constitutional cause. It had existed, he conjectured, for many months.

This being the plaintiff's case,

Overend criticised the evidence, turning what would be his own account, and averring that the

lameness of the horse arose from fever in the feet, caused by his being knocked about on the hard ground. The story of the numerous excrescences was imaginary; but he admitted that the horse had been "banged," and what hunter had not?

Mr Samuel James Welfit, the defendant, examined: Bought the horse from Mr Cole, of Thirk, for £130 in the spring of 1867, and it was then five years old, and sound. His hocks were a little coarse. Rode it as a hack the following summer, and hunted him with others through the season, sometimes one and sometimes two days a-week. At the end of November, was riding over a fence, when he got a thorn in the off knee, and it was treated for that; but he was hunted in his turn, and was not lame. The knee was swollen a good deal. Had his hocks fired at the end of the season, and then his knee was fired, but without his order or knowledge, and it remained enlarged. Hunted him in 1868 and 1869, and he was quite sound. In January 1869, he came across a piece of marl, and got a bang on the shin bone, but continued to hunt him, and he was quite sound, though one day he hunted him with a bandage, under which some gravel got, and turned him lame; but on removing the bandage the lameness was removed, but a mark was left. Continued to hunt him till the season closed, and he carried him better than any other horse. On the 16th February he bruised his near fore foot, and turned lame. Sent for a blacksmith to take of his shoe, and his foot was poulticed, and within a week he was perfectly sound again. His feet were not contracted, and there were no splints—no rheumatic symptoms, nor acute inflammation. The first year he rode him he also had a slight accident. Did not want to sell him, but Mason would have him, and he rode him down the road. He was perfectly sound when he came out of the stable, and when he came back. Did not tell Mason he was unsound. Mason wished him to keep the horse for the purpose of getting fresh, but not to get sound, because he was so. Never heard any complaint about the horse till the 16th October, when Mr Grimstone said he supposed the horse was lame from jumping about on the hard ground. The horse was then very lame on both feet, and Mason asked which foot was bruised, and said that did not lame him, "because he had knocked him about on the hard ground, and could not lame him." Getting the horse rapidly into condition might produce fever in the feet in a short time.

William Crisp, the groom who had charge of the horse while in possession of defendant, corroborated his employer's evidence.

John Webster, also groom to the defendant till lately, gave similar testimony.

Benjamin Holroy, blacksmith, shod the horse for two years, and it was never unsound during that time, except once when it bruised its foot.

Mr Herbert Bird, farmer, weighed 17 stone, and rode the horse in 1867, and had a very hard day, and then rode him home 20 miles. He went well, and was not lame.

Mr Robert Martin, Hemingby, weighing 11 stone, rode the horse one day, and had seen him out daily the last two seasons, and he appeared quite sound.

Mr Christopher Mason, of Bunker's Hill, and Mr Hard Mason, of Louth, and Captain Fox, gave evidence to the same effect.

George Waddington, jockey, W. Backhouse, whip of the South Wold hounds, had often seen the horse in the hunting field, but never lame.

Mr Daniel Gresswell, veterinary surgeon, Louth, attended Mr Welfit's horses, and knew this one. He attended its knee, and it was quite sound afterwards. He saw him in Feb. 1869, and he was sound then. There was no appearance of rheumatism at any time. He believed the enlargement of the knee was due to an injury. The shin was also enlarged. Injury to the periosteum of the bone will cause bony deposition.

Mr Joseph Clayworth, late veterinary surgeon, Hemingby, had seen the horse that morning, and found enlargement of both fore feet, apparently from overfeeding, which produced fever in the feet. He did not believe a horse could have gone through a day's hunting and gone sound if it had enlargement through rheumatism. A thorn might permanently enlarge the knee, with rheumatism, by inflaming the periosteum. There was no contraction of the feet. By Mr Field—Judged the overfeeding from the oblique condition of the anterior part of the foot. The fever must have existed some weeks, and perhaps six. There was no bony deposit on the shank of the off leg, only a slight tendency to splint; was satisfied the lameness was in the feet.

Professor Gamgee deponed—Had examined the horse this morning. He was lame in both fore feet, from injury from time to time, having prominent splints, and his shoes did not fit. There were no active splints in the feet, but he went tender on both, and the soles had been so pared that he had not sufficient

protection. Excessive diet would produce fever, and plunging on hard ground might produce such injuries. The condition of the knee did not cause lameness. The bony deposit might arise from the injury from a thorn, without rheumatism, and did not believe it arose from that affection. If it had had rheumatic affection it would be impossible not to shew much pain, or to have come home from hunting sound. The deposit on the shin might also arise from injury without rheumatism. The causes of the present lameness might have arisen within the last seven months. There were not dozens of deposits on the limbs, and none in the coronets. The appearance of the horse was quite consistent with its being sound on the 23d March 1869. The wasting of the shoulders was equal—not more in one than the other. There was nothing in the legs to indicate long standing disease in the legs. Cross-examined—Attributed the lameness to the bad shoes; if properly shod he would be sound.

Mr John Jekyll, late veterinary surgeon, Lincoln:—Had seen the horse that morning, and agreed very much with the last witness, bad shoeing had much to do with the lameness, and overfeeding, coupled with hard ground, frequently produced fever in the feet.

This being the whole of the evidence, the jury left the Court to view the horse, which was outside.

Mr Overend and Mr Field having addressed the jury, his Lordship, in summing up, observed that the only question for the consideration of the jury was, whether the horse was unsound at the time at which it was sold. It would be unsound if it had any disease or infirmity which would impair its usefulness, and the proof rested with the plaintiff, who must shew that the unsoundness in October was attributable to causes existing in March. His Lordship concluded his summing up at seven o'clock, the case having occupied the entire day.

The jury found for the defendant.

The Country Gentlewoman.

LETTERS TO FARMERS' DAUGHTERS.

RECREATION.

MY DEAR GIRLS,—Body and mind both require rest and relaxation at intervals, in order to maintain their full vigour. A change of employment will often afford rest, when entire inactivity would not. This is especially true with nervous, restless minds. Public speakers, writers, clergymen, &c., who astonish the world with their powers of accomplishment, are examples of this. Success would not attend them if they did not unbend occasionally to seek rest in change of occupation and healthful amusements.

The gambols of animals, insects, and birds, remind us of the innocence of play.

A cheery laugh helps digestion, and brightens those that hear it. A half hour's exercise in the gymnasium is a rest to muscles overtaxed by one position; and any out-of-door employment, to those confined by sedentary habits to the house, is an amazing rest. I once heard an esteemed clergyman say that he cured himself of an alarming attack of dyspepsia and hypochondria by sawing wood daily for about six weeks!

Cheerful society and argumentative conversation brace and invigorate a debilitated mind. Games of chess and backgammon are a real tonic to some; music is at once exhilaration and rest to others, and writing a letter from writing a sermon or a life.

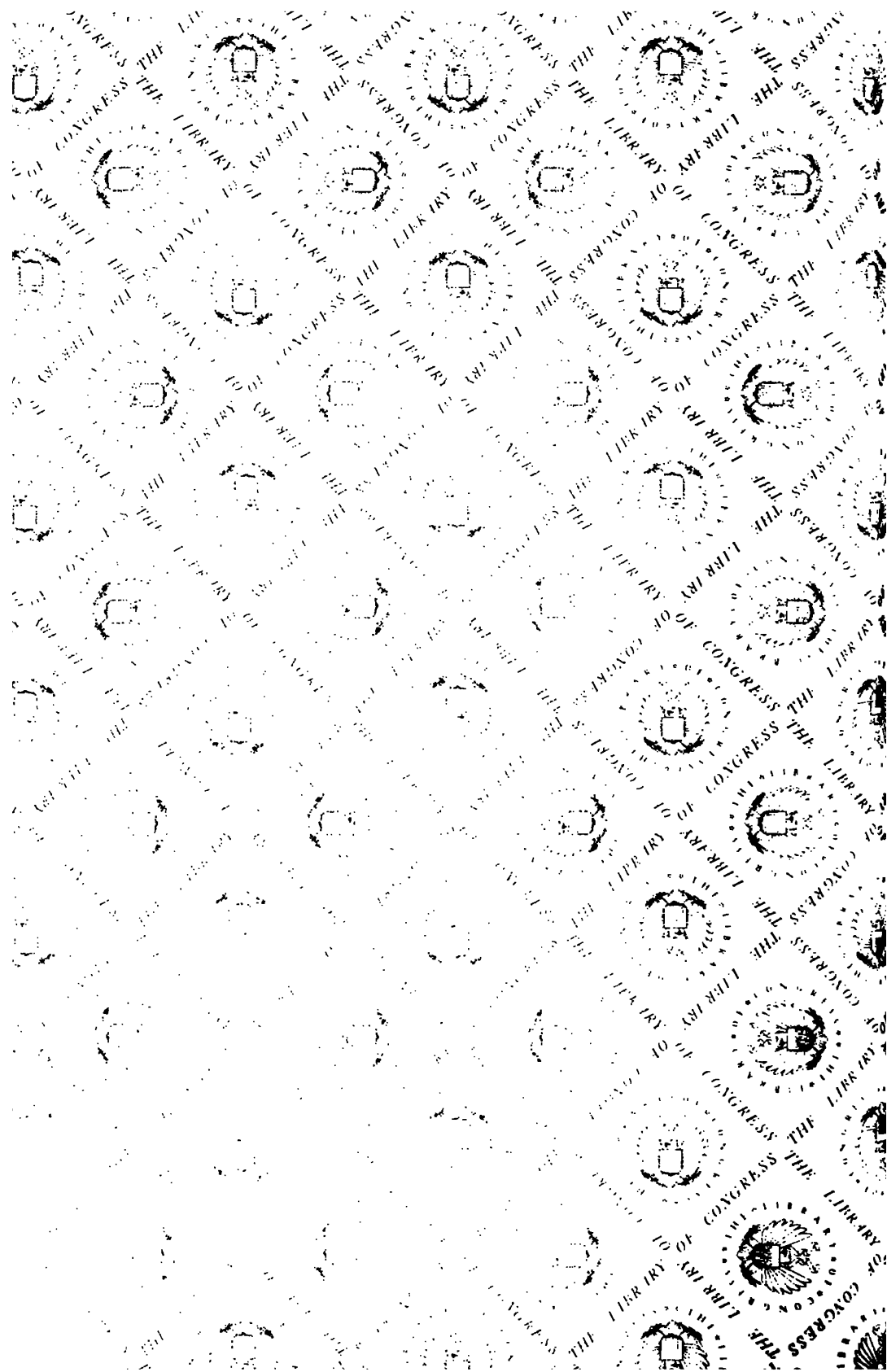
are sapping the vital energies when they discountenance all recreation, and would confine themselves and families to one weary round of toil.

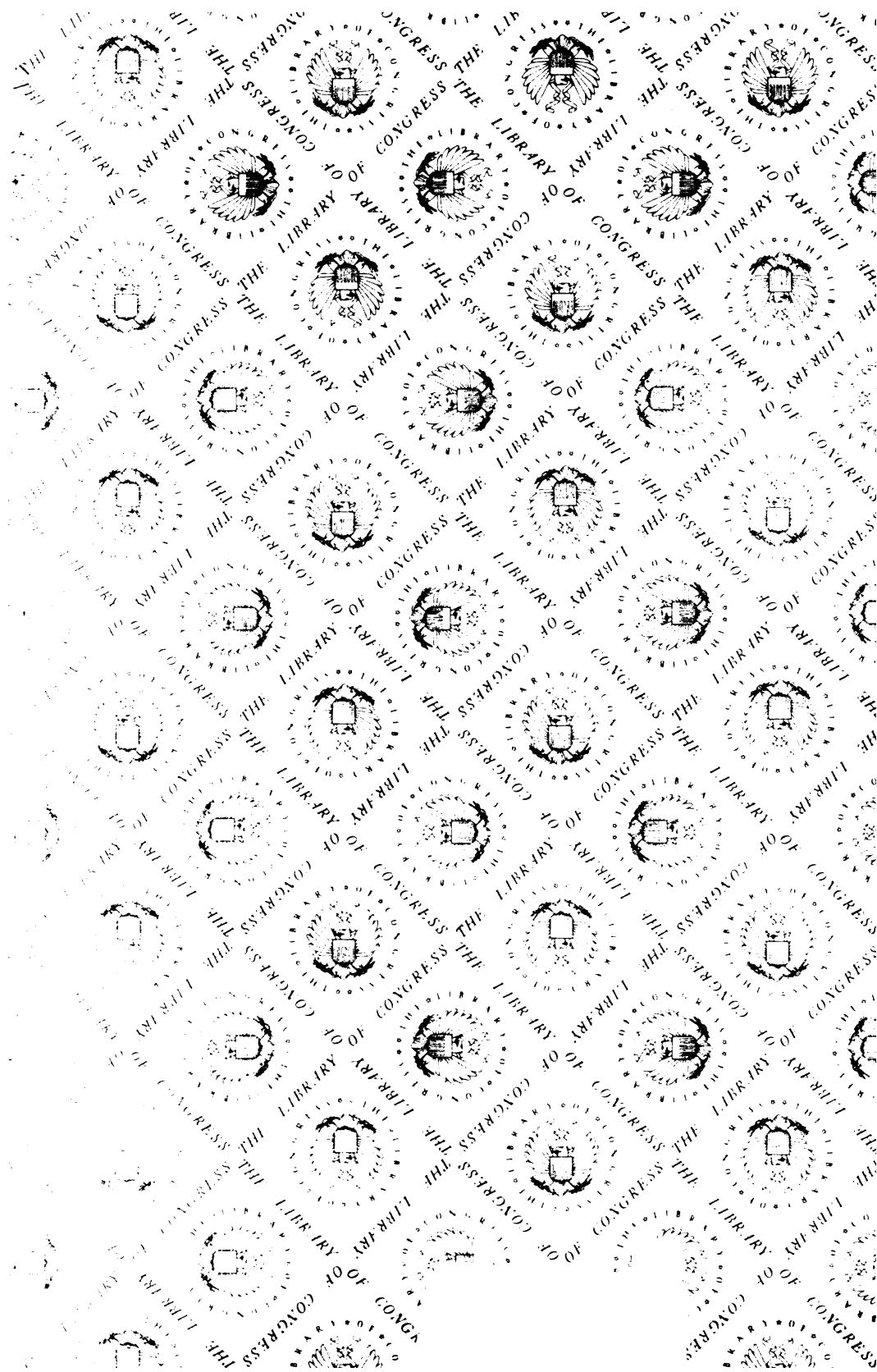
JE. Home amusements, pleasant surprises, material for a happy evening, should be as carefully studied and planned for as any department of labour. Games upon the chess-board, some new puzzle to dissect, acting charades and *tableaux*, the most delightful of all, varied with some entertaining reading, would enliven many a tired, discouraged household, and give new zest and courage for the burdens of another day.

Upon the daughters of a home falls a large share of obligation and privilege in this respect. Whether there shall be a happy evening at home, or an exciting one at the dance or billiard table, may be very much as the sisters say. Of course I do not mean in words, but as you shall have strength and tact and influence to control.

See to it, my dear girls, that you are not casting shadows to darken both your own path and that of those you love, by indifference, thoughtlessness, and selfishness on this subject; and when you go forth into new homes resolve that there shall be *play* as well as *work*; if you would accomplish much, have fine spirits and firm health.—Yours for play and work too.

T. S. H.





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